SONY

4-291-371-**11**(2)

Interchangeable Lens Digital HD Video Camera Recorder

Operating Guide

E-mount

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AVCHD Progressive

HDMI HIGH-DEFINITION MULTIMEDIA INTERFACE

MEMORY STICK

HANDYCAM

InfoLITHIUM V SERIES

SDXC CLASS 4

NEX-VG20E/VG20EH

Read this first

Before operating the unit, please read this manual thoroughly, and retain it for future reference.

WARNING

To reduce fire or shock hazard, do not expose the unit to rain or moisture.

Do not expose the batteries to excessive heat such as sunshine, fire or the like.

CAUTION

Battery pack

If the battery pack is mishandled, the battery pack can burst, cause a fire or even chemical burns. Observe the following cautions.

- Do not disassemble.
- Do not crush and do not expose the battery pack to any shock or force such as hammering, dropping or stepping on it.
- Do not short circuit and do not allow metal objects to come into contact with the battery terminals.
- Do not expose to high temperature above 60°C (140°F) such as in direct sunlight or in a car parked in the sun.
- Do not incinerate or dispose of in fire.
- Do not handle damaged or leaking lithium ion batteries.
- Be sure to charge the battery pack using a genuine Sony battery charger or a device that can charge the battery pack.
- Keep the battery pack out of the reach of small children.
- Keep the battery pack dry.
- Replace only with the same or equivalent type recommended by Sony.
- Dispose of used battery packs promptly as described in the instructions.

Replace the battery with the specified type only. Otherwise, fire or injury may result.

AC Adaptor

Do not use the AC Adaptor placed in a narrow space, such as between a wall and furniture.

Use the nearby wall outlet (wall socket) when using the AC Adaptor. Disconnect the AC Adaptor from the wall outlet (wall socket) immediately if any malfunction occurs while using your camcorder.

Note on the power cord (mains lead)

The power cord (mains lead) is designed specifically for use with this camcorder only, and should not be used with other electrical equipment.

Even if your camcorder is turned off, AC power source (mains) is still supplied to it while connected to the wall outlet (wall socket) via the AC Adaptor.

Excessive sound pressure from earphones and headphones can cause hearing loss.

For customers in the U.S.A. and CANADA

Battery pack and lens

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For customers in the U.S.A.

If you have any questions about this product, you may call:
Sony Customer Information Center 1-800-222-SONY (7669).
The number below is for the FCC related matters only.

Regulatory Information

Declaration of Conformity
Trade Name: SONY
Model No.: NEX-VG20E
Responsible Party: Sony Electronics Inc.
Address: 16530 Via Esprillo, San Diego, CA 92127 U.S.A.
Telephone No.: 858-942-2230
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.

The supplied interface cable must be used with the equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

Notice for the customers in the countries applying EU Directives

The manufacturer of this product is Sony Corporation, 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan. The Authorized Representative for EMC and product safety is Sony Deutschland GmbH, Hedelfinger Strasse 61, 70327 Stuttgart, Germany. For any service or guarantee matters please refer to the addresses given in separate service or guarantee documents.

This product has been tested and found compliant with the limits set out in the EMC Directive for using connection cables shorter than 3 meters (9.8 feet).

ATTENTION

The electromagnetic fields at the specific frequencies may influence the picture and sound of this unit.

Notice

If static electricity or electromagnetism causes data transfer to discontinue midway (fail), restart the application or disconnect and connect the communication cable (USB, etc.) again.

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment.
By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources.
For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

Disposal of waste batteries (applicable in the European Union and other European countries with separate collection systems)

This symbol on the battery or on the packaging indicates that the battery provided with this product shall not be treated as household waste.
On certain batteries this symbol might be used in combination with a chemical symbol. The chemical symbols for mercury (Hg) or lead (Pb) are added if the battery contains more than 0.0005% mercury or 0.004% lead.
By ensuring these batteries are disposed of correctly, you will help prevent potentially negative consequences for the environment and human health which could otherwise be caused by inappropriate waste handling of the battery. The recycling of the materials will help to conserve natural resources.
In case of products that for safety, performance or data integrity reasons require a permanent connection with an incorporated battery, this battery should be replaced by qualified service staff only.
To ensure that the battery will be treated properly, hand over the product at end-of-life to the applicable collection point for the recycling of electrical and electronic equipment.
For all other batteries, please view the section on how to remove the battery from the product safely. Hand the battery over to the applicable collection point for the recycling of waste batteries.
For more detailed information about recycling of this product or battery, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

Notice for customers in the United Kingdom

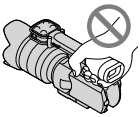
A moulded plug complying with BS 1363 is fitted to this equipment for your safety and convenience.

Should the fuse in the plug supplied need to be replaced, a fuse of the same rating as the supplied one and approved by ASTA or BSI to BS 1362, (i.e., marked with an ASTA or BSI mark) must be used. If the plug supplied with this equipment has a detachable fuse cover, be sure to attach the fuse cover after you change the fuse. Never use the plug without the fuse cover. If you should lose the fuse cover, please contact your nearest Sony service station.

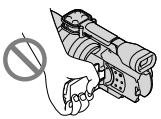
Using the camcorder

- Do not hold the camcorder by the following parts, and also do not hold the camcorder by the jack covers.

Viewfinder

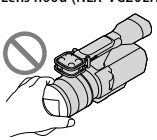


LCD Screen



Lens (NEX-VG20EH)

Lens hood (NEX-VG20EH)

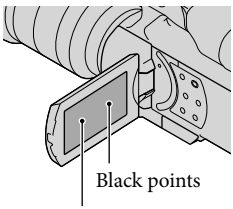


Built-in microphone

- The camcorder is not dustproofed, dripproofed or waterproofed. See “Precautions” (p. 65).

Menu items, LCD panel, viewfinder and lens

- A menu item that is grayed out is not available under the current recording or playback conditions.
- The LCD screen and viewfinder are manufactured using extremely high-precision technology, so over 99.99% of the pixels are operational for effective use. However, there may be some tiny black points and/or bright points (white, red, blue, or green in color) that appear constantly on the LCD screen. These points are normal results of the manufacturing process and do not affect the recording in any way.



- Do not record the sun or leave the camcorder under the sun for a long time. The inside of the camcorder may be damaged. If sunlight is focused on a nearby object, it may cause a fire. When you must place the camcorder under direct sunlight, attach the lens cap.
- Exposing the LCD screen, the viewfinder or the lens to direct sunlight for long periods of time may cause malfunctions.
- Do not aim at the sun. Doing so might cause your camcorder to malfunction. Take images of the sun only in low light conditions, such as at dusk.
- Do not look at the sun or a strong light through a removed lens. This may cause irrecoverable damage to your eyes.

About language setting

- The on-screen displays in each local language are used for illustrating the operating procedures. Change the screen language before using the camcorder if necessary (p. 23).

On recording

- To ensure stable operation of the memory card, it is recommended to format the memory card with your camcorder before the first use. Formatting the memory card will erase all the data stored on it and the data will be irrecoverable. Save your important data on your PC etc.
- Before starting to record, test the recording function to make sure the image and sound are recorded without any problems.
- Compensation for the contents of recordings cannot be provided, even if recording or

playback is not possible due to a malfunction of the camcorder, memory card, etc.
- TV color systems differ depending on the country/region. To view your recordings on a TV, you need a PAL system-based TV.
- Television programs, films, video tapes, and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to the copyright laws.
- Use the camcorder in accordance with local regulations.

Notes on playing back

- You may not be able to play back normally images recorded on your camcorder with other devices. Also, you may not be able to play back images recorded on other devices with your camcorder.
- Standard (STD) image quality movies recorded on SD memory cards cannot be played on AV equipment of other manufacturers.

DVD media recorded with HD image quality (high definition)

- DVD media recorded with high definition image quality (HD) can be played back with devices that are compatible with the AVCHD standard. You cannot play discs recorded with high definition image quality (HD) with DVD players/recorders as they are not compatible with the AVCHD format. If you insert a disc recorded with the AVCHD format (high definition image quality (HD)) into a DVD player/recorder, you may not be able to eject the disc.

Save all your recorded image data

- To prevent your image data from being lost, save all your recorded images on external media periodically. To save images on your computer, see page 42, and to save images on external devices, see page 50.
- The type of discs or media on which the images can be saved depend on the [REC Mode] selected when the images were recorded. Movies recorded in [50p Quality PS] or [Highest Quality FX] can be saved on external media or on Blu-ray discs (p. 50).

Notes on battery pack/AC Adaptor

- Be sure to remove the battery pack or the AC Adaptor after turning off the camcorder.
- Disconnect the AC Adaptor from the camcorder, holding both the camcorder and the DC plug.

Note on the camcorder/battery pack temperature

- When the temperature of the camcorder or battery pack becomes extremely high or extremely low, you may not be able to record or play back on the camcorder, due to the protection features of the camcorder being activated in such situations. In this case, an indicator appears on the LCD screen or on the viewfinder.

When the camcorder is connected to a computer or accessories

- Do not try to format the memory card of the camcorder using a computer. If you do so, your camcorder may not operate correctly.
- When connecting the camcorder to another device with communication cables, be sure to insert the connector plug in the correct way. Pushing the plug forcibly into the terminal will damage the terminal and may result in a malfunction of the camcorder.

If you cannot record/play back images, perform [Format]

- If you repeat recording/deleting images for a long time, fragmentation of data occurs on the memory card. Images cannot be saved or recorded. In such a case, save your images on some type of external media first, and then perform [Format] by touching MENU (MENU) → [Setup] → [(Media Settings)] → [Format] → OK → OK.

Notes on optional accessories

- We recommend using genuine Sony accessories.
- Genuine Sony accessories may not be available in some countries/regions.

About this manual, illustrations and on-screen displays

- The example images used in this manual for illustration purposes are captured using a digital still camera, and therefore may appear different from images and screen indicators that actually appear on your camcorder. And, the illustrations of your camcorder and its screen indication are exaggerated or simplified for understandability.
- In this manual, the DVD disc recorded with high definition image quality (HD) is called AVCHD recording disc.
- Design and specifications of your camcorder and accessories are subject to change without notice.

Notes on use

- Do not do any of the following. Otherwise, the memory card may be damaged, recorded images may be impossible to play back or may be lost, or other malfunctions could occur.
  – ejecting the memory card when the access lamp (p. 27) is lit or flashing
  – removing the battery pack or AC Adaptor from the camcorder, or applying mechanical shock or vibration to the camcorder when the (Movie)/ (Photo) lamps (p. 30) or the access lamp (p. 27) are lit or flashing
- When using a shoulder belt (sold separately), do not crash the camcorder against an object.

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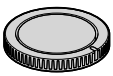
Step 1: Checking supplied items

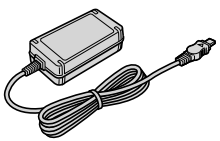
Make sure that you have following items supplied with your camcorder.
The numbers in ( ) are the supplied quantity.

All models

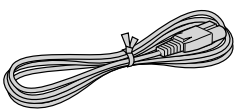
- This camcorder (1)
- Body cap (attached to camcorder NEX-VG20E; supplied but not attached to other models) (1) (p. 16)



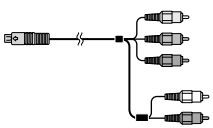
- AC Adaptor (1) (p. 13)



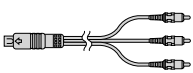
- Power cord (mains lead) (1) (p. 13)



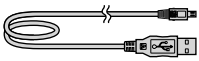
- Component A/V Cable (1) (p. 38)



- A/V connecting cable (1) (p. 38)



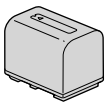
- USB cable (1) (p. 50)



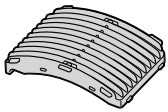
- Wireless Remote Commander (RMT-835) (1)

A button-type lithium battery is already installed.

- Rechargeable battery pack (NP-FV70) (1) (p. 13)



- Battery Cover (1) (p. 12)



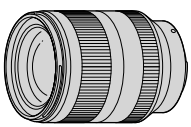
- Wind Screen (1) (p. 12)

- Large eyecup (1) (p. 26)

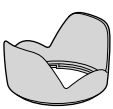
- CD-ROM “Handycam” Application Software (1) (p. 43)
  – “PMB” (Software, including “PMB Help”)
  – Image Data Converter (RAW development software)
  – “Handycam” Handbook (PDF)
- Operating Guide (This manual) (1)

NEX-VG20EH

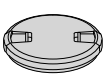
- Zoom lens (E 18-200mm F3.5-6.3 OSS) (attached to the camcorder) (1) (p. 16)



- Lens hood (1) (p. 20)



- Front lens cap (attached to the lens) (1) (p. 16)



- Rear lens cap (1) (p. 16)

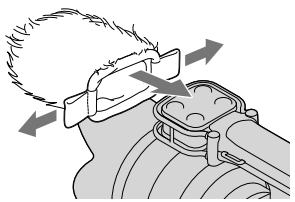
Step 2: Attaching the supplied accessories

Attaching the lens

See page 16 for information on attaching the lens. The NEX-VG20E does not come with the E 18-200mm F3.5-6.3 OSS lens. Please use appropriate lenses (sold separately).
For NEX-VG20EH models, the lens is attached to the camcorder at the time of purchase.

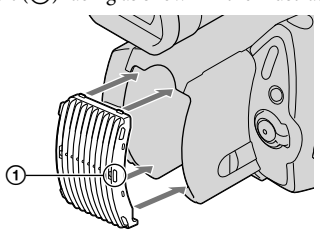
Attaching the Wind Screen

Use the Wind Screen when you want to reduce the wind noise recorded by the microphone. Attach the Wind Screen with the Sony logo facing down.

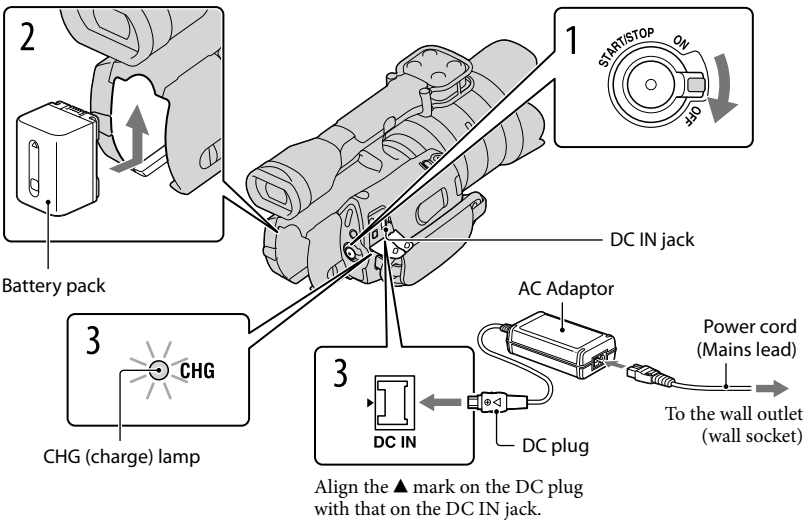


Attaching the battery cover

Attach the battery cover after attaching the battery pack.
Attach the battery cover with the projecting part (①) facing as shown in the illustration.



Step 3: Charging the battery pack



You can charge the "InfoLITHIUM" battery pack (V series) after attaching it to your camcorder.

Notes

- You cannot attach any "InfoLITHIUM" battery pack other than the V series to your camcorder.
- You cannot attach the "InfoLITHIUM" battery pack NP-FV30/FV50, even though they are V series.

1 Slide the POWER switch to OFF (the default setting).

2 Attach the battery pack by sliding it in the direction of the arrow until it clicks.

3 Connect the AC Adaptor and the power cord (mains lead) to your camcorder and the wall outlet (wall socket).

The CHG (charge) lamp lights up and charging starts. The CHG (charge) lamp turns off when the battery pack is fully charged.

4 When the battery is charged, disconnect the AC Adaptor from the DC IN jack of your camcorder.

Charging time

Approximate time (min.) required when you fully charge a fully discharged battery pack.

Battery pack	Charging time
NP-FV70 (supplied)	195
NP-FV100	390

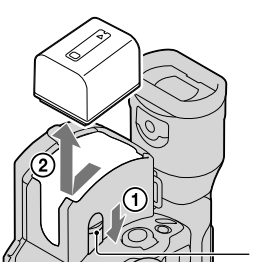
- The charging times shown in the table above are measured when charging the camcorder at a temperature of 25 °C (77 °F). It is recommended that you charge the battery in a temperature range of 10 °C to 30 °C (50 °F to 86 °F).

Tips

- See page 63 on recording and playing time.
- When your camcorder is on, you can check the approximate amount of remaining battery power with the remaining battery indicator at the upper right on the LCD screen.

To remove the battery pack

Slide the POWER switch to OFF. Slide the BATT (battery) release lever (①) and remove the battery pack (②).



To use a wall outlet (wall socket) as a power source

Make the same connections as “Step 3: Charging the battery pack” (p. 13). Even if the battery pack is attached, the battery pack is not discharged.

Notes on the battery pack

- When you remove the battery pack or disconnect the AC Adaptor, turn the camcorder off and make sure that the (Movie)/ (Photo) lamps (p. 30), the access lamp (p. 27) are turned off.
- The CHG (charge) lamp flashes during charging under the following conditions:
  – The battery pack is not attached correctly.
  – The battery pack is damaged.
  – The temperature of the battery pack is low.
  Remove the battery pack from your camcorder and put it in a warm place.
  – The temperature of the battery pack is high.
  Remove the battery pack from your camcorder and put it in a cool place.
- In the default setting, the power turns off automatically if you leave your camcorder without any operation for about 5 minutes, to save battery power ([A. Shut Off]).

Notes on the AC Adaptor

- Use the nearby wall outlet (wall socket) when using the AC Adaptor. Disconnect the AC Adaptor from the wall outlet (wall socket) immediately if any malfunction occurs while using your camcorder.
- Do not use the AC Adaptor placed in a narrow space, such as between a wall and furniture.
- Do not short-circuit the DC plug of the AC Adaptor or battery terminal with any metallic objects. This may cause a malfunction.

Note on the power cord (Mains lead)

The power cord (Mains lead) is designed specifically for use with this camcorder only, and should not be used with other electrical equipment.

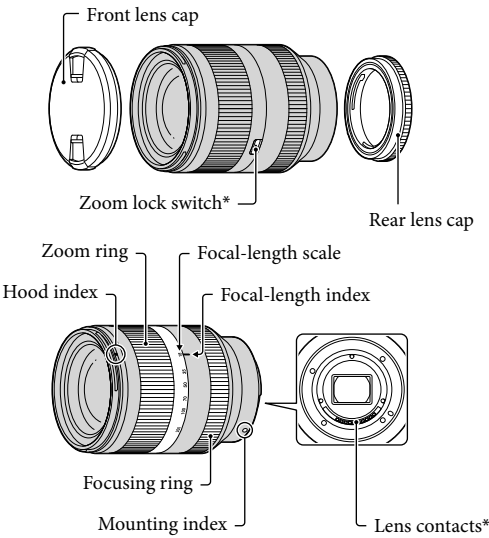
Charging the battery pack abroad

You can charge the battery pack in any countries/regions using the AC Adaptor supplied with your camcorder within the AC 100 V - 240 V, 50 Hz/60 Hz range.

- Do not use an electronic voltage transformer.

Step 4: Attaching the lens

This manual explains how to attach a lens using the E 18-200mm F3.5-6.3 OSS lens that comes with NEX-VG20EH (the lens is attached to the camcorder at the time of purchase). If you use another lens, refer to the instruction manual supplied with that lens.

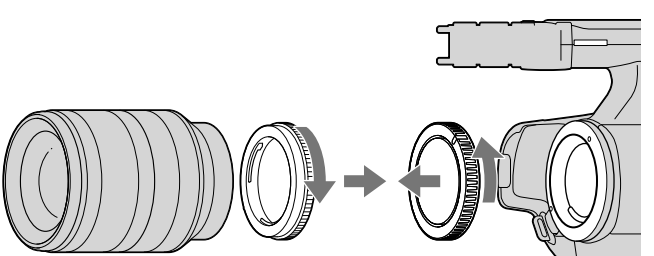


* This switch prevents the lens cylinder from being extended by its own weight when it is being transported, etc. Turn the zoom ring back toward the W-end, and slide the switch toward ▼ to lock it. To unlock it, set the switch to the original position.

**Do not touch or dirty the lens contacts.

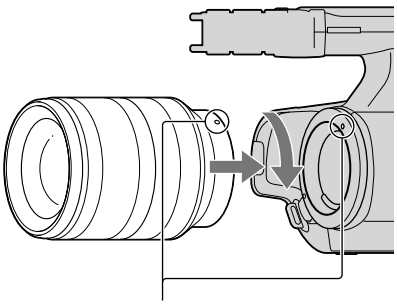
---

1 Remove the body cap from the camcorder body and the packaging lid from the rear of the lens.



2 Mount the lens by aligning the mounting indexes (white) on the lens and the camcorder body. While pushing the lens lightly toward the camcorder body, turn the lens clockwise until it clicks into the locked position.

Be sure to put the lens on straight.



Mounting indexes (white)

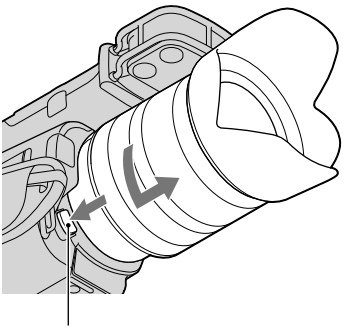
Notes

- When attaching a lens, do not press the lens release button.
- Do not use force when attaching a lens. Mounting the lens forcibly may result in a malfunction or damage of the lens mount.
- There may be some slight movement of the lens in the locked position, depending on the lens used. This is not a malfunction.
- Hold the camcorder body with the front end downward, and quickly change the lens somewhere away from dusty locations so as to keep dust or debris from getting inside the camcorder body.

Removing the lens

1 While pressing the lens release button all the way in, turn the lens counterclockwise until it stops.

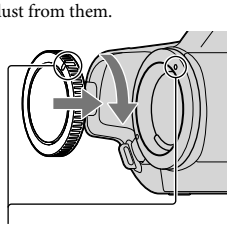
- When you remove the lens, make sure that you hold both of the lens and the camcorder body.



Lens release button

2 Replace the packaging lid on the lens and attach the body cap to the camcorder body.

- Align the mark on the body cap to the mounting indexes, and turn the cap clockwise.
- Before you attach caps, remove dust from them.



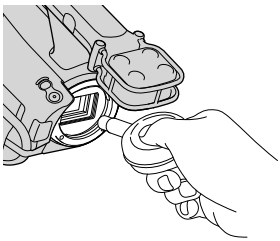
Align the marks.

Notes

- When changing the lens, if dust or debris gets inside the camcorder body and adheres to the surface of the image sensor (the part that acts as the film), it may appear on the image, depending on the shooting conditions. The image sensor is applied with the anti-dust coating, to prevent dust from adhering to the image sensor. However, attach or remove the lens quickly somewhere away from dusty locations.
- Do not leave the camcorder body with the lens and body cap removed.

If dust or debris adheres on the image sensor

Turn off the camcorder and detach the lens. Clean the image sensor and the surrounding area using a blower (sold separately), and then reattach the lens.

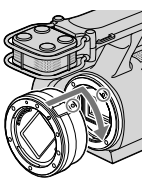


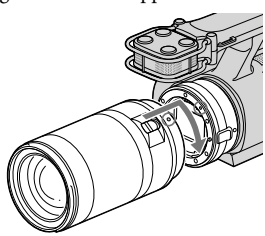
Notes

- Do not use a spray blower because it may scatter water droplets inside the camcorder body.
- Do not put the tip of a blower into the cavity beyond the mount, so that the tip of the blower does not touch the image sensor.
- Hold the camcorder's face downward to prevent the dust from resettling in the camcorder.
- Do not apply a mechanical shock to the camcorder during cleaning.
- If you cannot clean the image sensor by the above procedure, consult your Sony dealer or local authorized Sony service facility.

Mount Adaptor

Using a Mount Adaptor (sold separately), you can attach an A-mount lens (sold separately) to your camera. For details, refer to the operating instructions supplied with the Mount Adaptor.





The available functions differ depending on the Mount Adaptor type.

Functions	LA-EA1	LA-EA2
Autofocus	Available with SAM/SSM lens only*	Available
AF system	Contrast AF	Phase-detection AF
AF/MF Select	Switchable on the lens	SAM/SSM lenses: switchable on the lens Other lenses: switchable on the FOCUS button
Autofocus Mode (Only photo mode)	Single	Single/Continuous

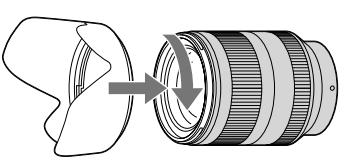
* With LA-EA1, autofocus speed with an A-mount lens attached will be slower compared to an E-mount lens. (When an A-mount lens is attached, the autofocus speed will be about 2 seconds to 7 seconds, when shooting under Sony measurement condition. The speed may vary depending on the subject, ambient light, etc.)

Notes

- Some lenses may not be usable or may have limited functionality. Check the dedicated support web site or consult your local authorized Sony service facility on compatible lenses.
- The sound of the lens and the camera in operation may be recorded during movie recording. You can avoid this by setting Audio Rec Level to minimum. Touch MENU (MENU) → [Camera/Mic] → [(Microphone)] → [Audio Rec Level].
- It may take a long time or may be difficult for the camera to focus, depending on the lens used or the subject.

To attach the lens hood

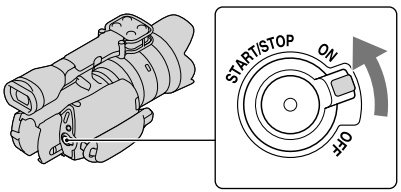
Align the red line of the lens hood to that of the lens and mount the lens hood on the lens. Turn the lens hood clockwise until the red dot of the lens hood and the red line of the lens align with a click.



When storing the lens, fit the lens hood onto the lens backwards.

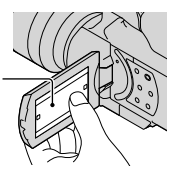
Step 5: Turning the power on, and setting the date and time

1 Slide the POWER switch to ON while pressing the green button.



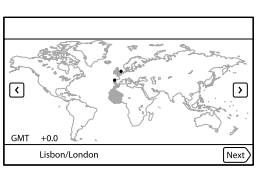
POWER switch

2 Select the desired language, then touch [Next].



Touch the button on the LCD screen

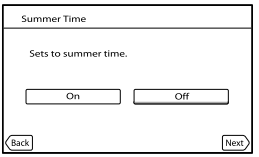
3 Select the desired geographical area with < / >, then touch [Next].



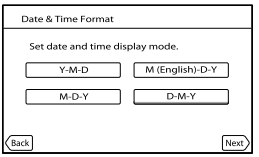
- To set the date and time again, touch MENU (MENU) → [Setup] → [(Clock Settings)] → [Date & Time Setting] → [Date & Time]. When an item is not on the screen, touch ^ / v until the item appears.

4 Set [Summer Time], then touch [Next].

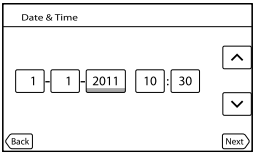
- If you set [Summer Time] to [On], the clock advances 1 hour.



5 Select the date format, then touch [Next].



6 Select the date and time, touch ^/v to set the value, then touch [Next] → OK.



The clock starts.

Notes

- The date and time does not appear during recording, but they are automatically recorded on the memory card, and can be displayed during playback. To display the date and time, touch MENU (MENU) → [Setup] → [▶ (▶ Playback Settings)] → [Data Code] → [Date/Time] → OK.
- You can turn off the operation beeps by touching MENU (MENU) → [Setup] → [🔧 (🔧 General Settings)] → [Beep] → [Off] → OK.
- If the button you touch does not react correctly, calibrate the touch panel.

To turn off the power

Slide the POWER switch to OFF.
The 🎞 (Movie) lamp flashes for a few seconds and the camcorder is turned off.

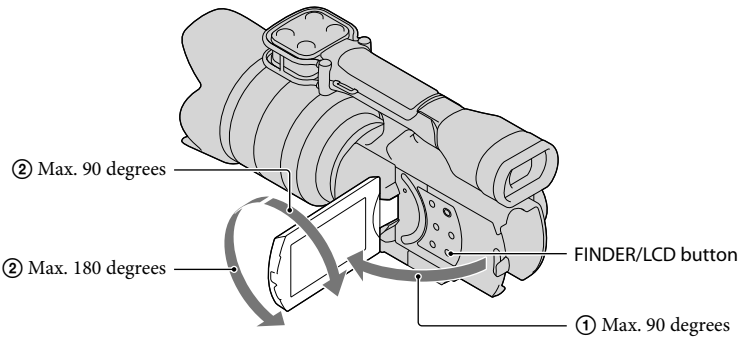
Changing the language setting

You can change the on-screen displays to show messages in a specified language.
Touch MENU (MENU) → [Setup] → [🔧 (🔧 General Settings)] → [Language Setting] → a desired language → OK → ✕ → ✕.

Step 6: Making setting adjustments before recording

The LCD panel

Open the LCD panel 90 degrees to the camcorder (①), and then adjust the angle (②).

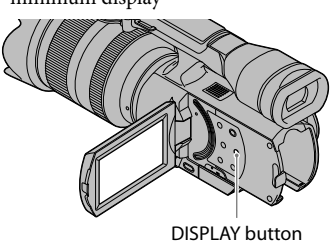


Tips

- Images are displayed on the viewfinder or the LCD screen.
- Press FINDER/LCD to select whether you want to display the image on the viewfinder or the LCD screen.
  You can also select those display locations by opening or closing the LCD screen.
- FINDER/LCD enables you to use the viewfinder without closing the LCD panel, so you can operate buttons which are hidden when the LCD screen is closed.
- You can adjust the brightness of the LCD screen with [LCD Brightness].

Changing the display on the LCD screen

Press DISPLAY to cycle the screen display in the following order:
Recording: Detailed display → simple display → minimum display
Playing: Detailed display → minimum display

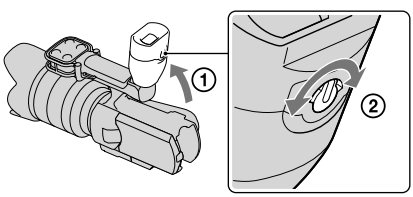


Tips

- In the default setting, the screen display changes to the simple display after about 4 seconds ([Display Setting]). The display changes to the detailed display when you touch anywhere on the screen except the buttons on the LCD screen so that you can use items.

The viewfinder

When you record while viewing through the viewfinder, close the LCD panel, or press FINDER/LCD (p. 73). If the indications in the viewfinder appear blurred, adjust the viewfinder lens adjustment lever located beneath the viewfinder.



Notes

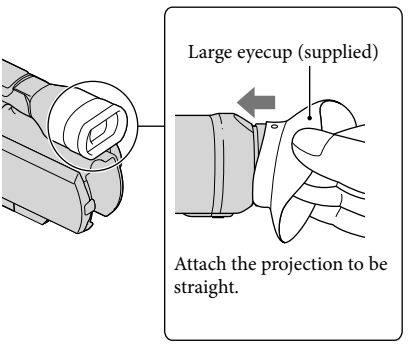
- You may see colors (red, blue, green) shimmering in the viewfinder when you move your line of sight. This is not a malfunction. The shimmering colors will not be recorded on the memory card.

Tips

- You can adjust the brightness of the viewfinder backlight from [VF Brightness].

If the image is not clear in the viewfinder

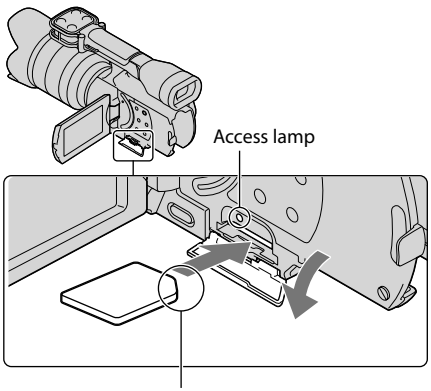
If you cannot see the picture in the viewfinder clearly under bright circumstances, use the supplied large eyecup. To attach the large eyecup, stretch it slightly and align it with the eyecup groove in the viewfinder. You can attach the large eyecup facing either the right or left side.



Notes

- Do not remove the pre-attached eyecup.

Step 7: Inserting a memory card



1 Open the cover, and insert the memory card with the notched edge in the direction as illustrated until it clicks.

The [Preparing image database file. Please wait.] screen appears if you insert a new memory card. Wait until the screen disappears.

2 Close the cover.

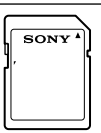
Notes

- If [Failed to create a new Image Database File. It may be possible that there is not enough free space.] is displayed, format the memory card.
- Confirm the direction of the memory card. If you forcibly insert the memory card in the wrong direction, the memory card, memory card slot, or image data may be damaged.
- Do not open the cover during recording.
- When inserting or ejecting the memory card, be careful so that the memory card does not pop out and drop.

To eject the memory card

Open the cover and lightly push the memory card in once.

Types of memory card you can use with your camcorder

		SD Speed Class	Described in this manual
“Memory Stick PRO Duo” media (Mark2) “Memory Stick PRO-HG Duo” media		—	“Memory Stick PRO Duo” media
SD memory card SDHC memory card SDXC memory card		Class 4 or faster	SD card

- Operation with all memory cards is not assured.
- “Memory Stick PRO Duo” media, half the size of “Memory Stick”, or standard size SD cards can be used for this camcorder.
- Do not attach a label or the like on memory card or memory card adaptor. Doing so may cause a malfunction.
- “Memory Stick PRO Duo” media of up to 32 GB and SD cards of up to 64 GB have been verified to operate with your camcorder.

Notes

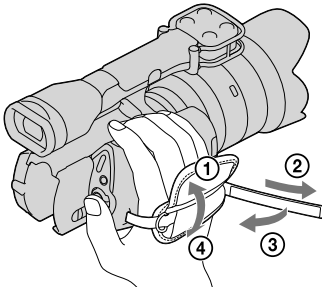
- A MultiMediaCard cannot be used with this camcorder.
- Movies recorded on SDXC memory cards cannot be imported to or played back on computers or AV devices not supporting the exFAT* file system by connecting the camcorder to these devices with the USB cable. Confirm in advance that the connecting equipment is supporting the exFAT system. If you connect an equipment not supporting the exFAT system and the format screen appears, do not perform the format. All the data recorded will be lost.

  * The exFAT is a file system that is used for SDXC memory cards.

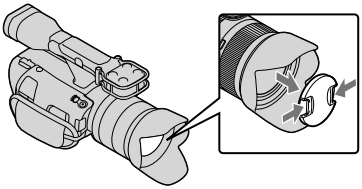
Recording

In the default setting, movies are recorded with high definition image quality (HD).

1 Fasten the grip belt.

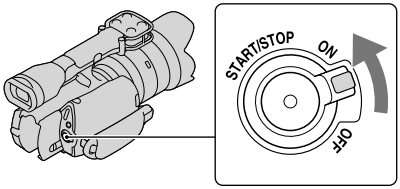


2 To remove the lens cap, push the sliders on both sides of the cap.



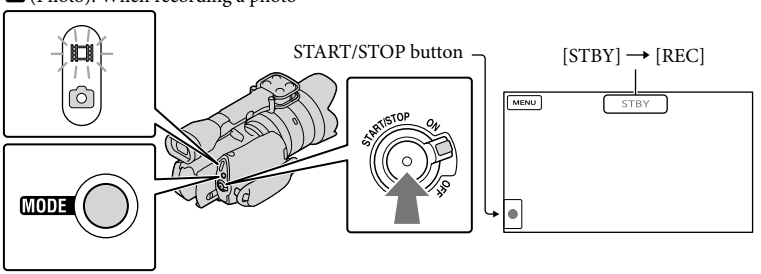
3 Slide the POWER switch to ON while pressing the green button.

Your camcorder is turned on.



Recording movies

(Movie): When recording a movie
(Photo): When recording a photo



1 Press MODE to turn on the (Movie) lamp.

2 Press START/STOP to start recording.

The recording lamp lights up during recording (p. 74).
To stop recording, press START/STOP again.

Notes

- The maximum continuous recordable time of movies is about 13 hours.
- When a movie file exceeds 2 GB, the next movie file is created automatically.
- It will take several seconds until you can start recording after you turn on the camcorder. You cannot operate your camcorder during this time.
- The following states will be indicated if data is still being written onto the recording media after recording has finished. During this time, do not apply shock or vibration to the camcorder, or remove the battery or AC Adaptor.
  – Access lamp (p. 27) is lit or flashing
  – The media icon in the upper right of the LCD screen is flashing
- The camcorder does not have a power zoom function.
- Hold the lens with your left hand to support the camera during recording (when you do not use a tripod). Make sure that your fingers are not touching the microphone.

Tips

- See page 64 on the recordable time of movies.
- The IRIS, Shutter Speed, Gain and Exposure are set to automatic adjustment when PROGRAM AE is pressed.

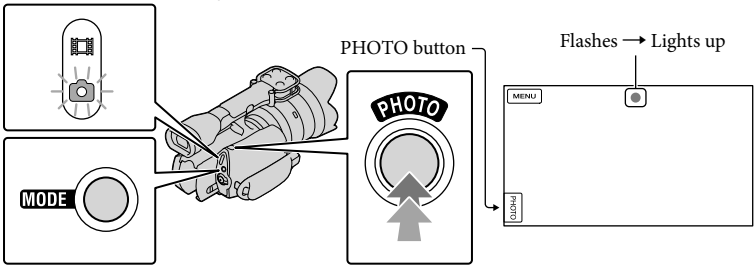
- [SteadyShot] is set to [Standard] in the default setting. Note that if the attached lens does not have an image stabilizing feature, SteadyShot will not be usable.
- You can capture photos from recorded movies.
- You can check the recordable time, estimated remaining capacity, etc., by touching MENU (MENU) → [Setup] → [(Media Settings)] → [Media Info].
- The LCD screen of your camcorder can display recording images across the entire screen (full pixel display). However, this may cause slight trimming of the top, bottom, right and left edges of images when played back on a TV which is not compatible with full pixel display. In this case, set [Guide Frame] to [On], and record images using the outer frame displayed on the screen as a guide.

Data code during recording

The recording date, time and condition are recorded automatically on the memory card. They are not displayed during recording. However, you can check them as [Data Code] during playback. To display them, touch MENU (MENU) → [Setup] → [(Playback Settings)] → [Data Code] → a desired setting → OK.

Shooting photos

(Movie): When recording a movie
(Photo): When recording a photo



When disappears, the photo is recorded.

1 Press MODE to turn on the (Photo) lamp.

The LCD screen display switches for photo recording mode.

2 Press PHOTO lightly to adjust the focus, then press it fully.

Focus indicator

The focus indicator shows the focusing status by lighting/flashing.

- ● lit : Focus locked.
- ● flashing : The camcorder cannot focus on the subject automatically. Either recompose the shot or change the focus setting.

Tips

- See page 64 on the recordable number of photos.
- The IRIS, Shutter Speed, ISO and Exposure are set to automatic adjustment when PROGRAM AE is pressed.
- To change the image size, touch MENU (MENU) → [Image Quality/Size] → [Image Size] → a desired setting → OK.
- You cannot record photos while is displayed.

Selecting the recording mode

You can change the quality of the image that you record by touching MENU (MENU) → [Image Quality/Size] → [REC Mode].

The types of media that images can be saved on will depend on the recording mode selected.

For details on a save operation using the external devices, see page 50.

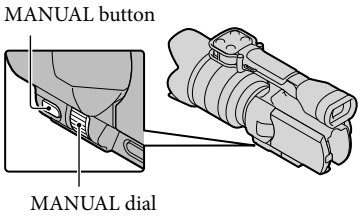
Types of media	Recording mode		
	PS*	FX	FH/HQ/LP
On this camcorder			
Memory card	✓	✓	✓
On external devices			
External media (USB storage devices)	✓	✓	✓
Blu-ray discs	✓	✓	✓
AVCHD recording discs	—	—	✓

* [PS] can be set only when [Frame Rate] is set to [50p].

Adjusting for shooting conditions

Adjusting Exposure, etc., manually (MANUAL dial)

It is convenient to make manual adjustments using the MANUAL dial, by assigning a menu item ([Exposure] in the default setting) to the MANUAL dial.



How to use the MANUAL dial

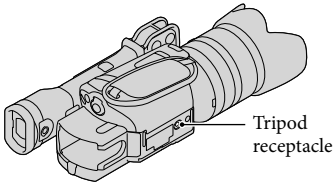
Adjust with MANUAL dial to make the adjustment also when pressing IRIS or SHUTTER SPEED.

To assign a menu item

Press and hold MANUAL for a few seconds to display the [MANUAL Button] screen. Rotate the MANUAL dial to assign an item. You can assign [Exposure], [Gain (ISO)], [IRIS], [Shutter Speed], [AE Shift], or [White Balance Shift].

Using a tripod

Attach a tripod (sold separately) to the tripod receptacle using a tripod screw (sold separately, the length of the screw must be less than 5.5 mm (7/32 in.)).



Playback on the camcorder

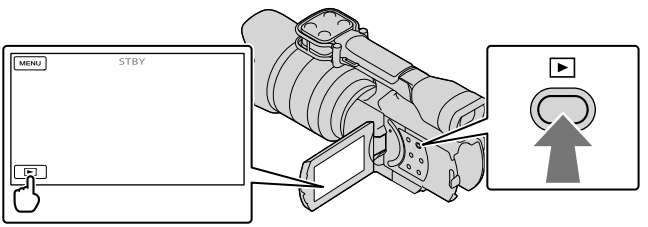
Tips

- The camcorder displays recorded images as an event automatically based on the date and time.

1 Slide the POWER switch to ON while pressing the green button.

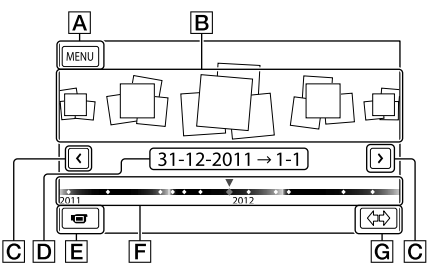
Your camcorder is turned on.

2 Press (View Images).



The Event View screen appears after some seconds.

3 Touch / to select the desired event (B).

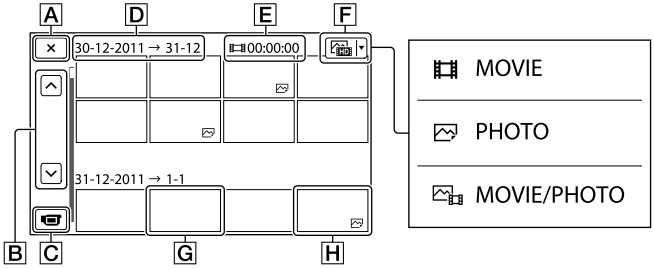


A To the MENU screen
B Events
C / : To the previous/next event
D Event name
E Change to the movie/photo recording mode
F Time-line bar
G Change Event Scale button

The Event Index screen appears when you touch the event that is displayed on the center.

- Touch (G Change Event Scale) on the bottom right of the screen so that you can change the time range of the time-line bar from one and a half years to three months, which changes the number of the events that can be displayed on the time-line bar.

4 Touch an image you want to view.



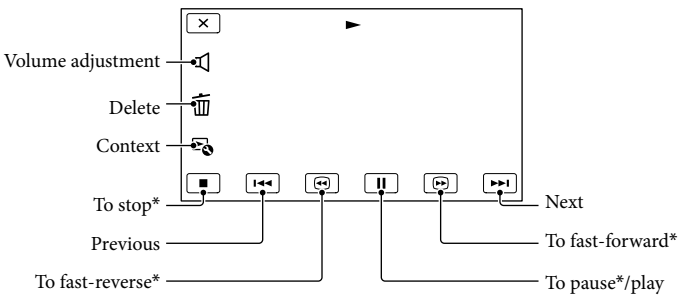
Touch F to select the image type to be displayed in the index from [MOVIE] (movies only), [PHOTO] (photos only), or [MOVIE/PHOTO] (movies and photos mixed).

A To go back to the Event View screen
B / : Displays the previous/next page (Touching and holding the button scrolls the index screen.)
C Change to the movie/photo recording mode
D Event title
E Total time of movies in the Event (The total number of still images is displayed when there are still images only)
F Switch Image Type button
G Movie
H Photo

- I▶I appears with the movie or photo that was most recently played or recorded. If you touch the movie or photo with I▶I, you can continue playback from the previous time.

Operating the camcorder while playing a movie

You can use the functions shown in the figure below while the camcorder is playing a movie. The figure below will be displayed when you select [MOVIE/PHOTO] (the default setting) or [MOVIE] by touching the Switch Image Type button on the Event Index screen.



* These buttons can be used only when the camcorder is playing a movie.

Notes

- You may not be able to play back the images with other devices than camcorder.

Tips

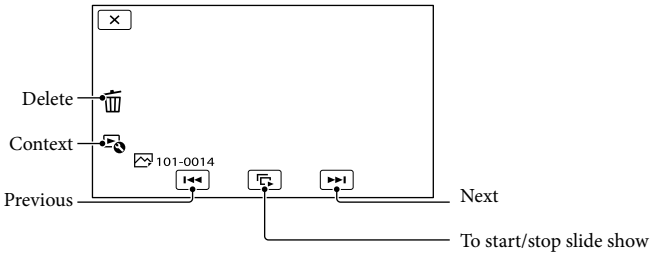
- Touching the button on the playback screen displays functions you can currently use, and allows you to use those functions easily.
- When playback from the selected image reaches the last image, the screen returns to the INDEX screen.
- Touch / during pause to play back movies slowly.
- As you repeat touching / during playback, movies are played as fast as about 5 times → about 10 times → about 30 times → about 60 times.
- The recording date, time, and shooting conditions are recorded automatically during recording. This information is not displayed during recording, but you can display it during playback by touching MENU (MENU) → [Setup] → [(Playback Settings)] → [Data Code] → a desired setting → OK → .

To adjust the sound volume of movies

While playing back movies, touch → adjust with / → OK.

Viewing photos

You can use the functions shown in the figure below while you are viewing photos. The figure below will be displayed when you select [PHOTO] by touching the Switch Image Type button on the Event Index screen.



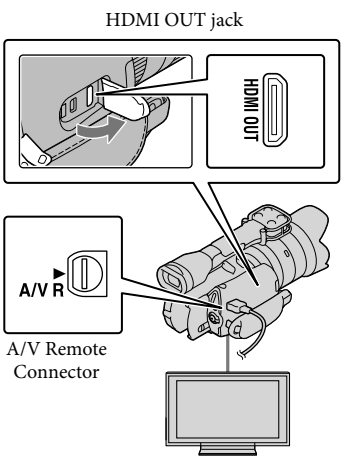
Tips

- To repeat Slideshow, touch → [Slideshow Set].

Playing images on a TV

Connection methods and the image quality (high definition (HD) or standard definition (STD)) viewed on the TV screen differ depending on what type of TV is connected, and the connectors used.
You can watch images on your TV screen even while they are being recorded.

Output connectors on the camcorder



1 Switch the input on the TV to the connected jack.

- Refer to the instruction manuals of the TV.

2 Connect the camcorder to a TV.

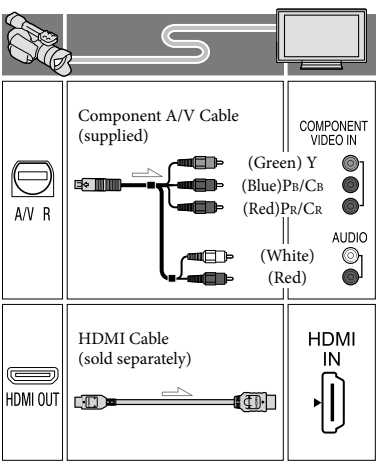
- Use the supplied AC Adaptor as the power source (p. 14).

3 Play a movie or a photo on the camcorder (p. 34).

List of connection

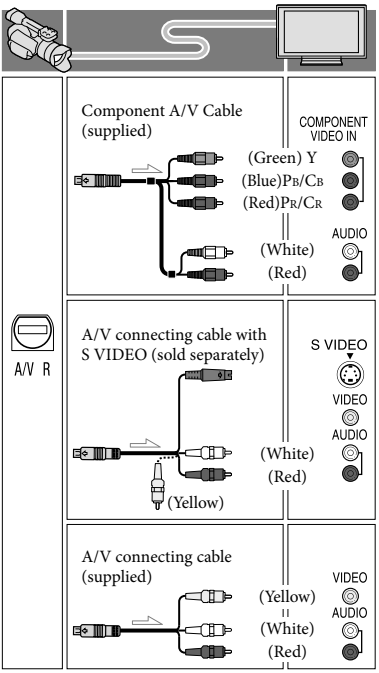
Connecting to a high definition TV

When the recording quality is high definition image quality (HD), the movies are played back in high definition image quality (HD). When the recording quality is standard image quality (STD), the movies are played back in standard definition image quality (STD).



Connecting to a non-high-definition 16:9 (wide) or 4:3 TV

When movies are recorded with high definition image quality (HD), they are played back in standard definition image quality (STD). When movies are recorded with standard image quality (STD), they are played back in standard definition image quality (STD).



When you connect with component A/V cable

- If you connect only component video plugs, audio signals are not output. Connect the white and red plugs to output audio signals.
- Select the [Component] setting for the component input jack you are using. Touch MENU (MENU) → [Setup] → [(Connection)] → [Component] → a desired setting → OK to make the setting.

When you connect with HDMI cable

- Use an HDMI cable with the HDMI logo.
- Use an HDMI mini connector on one end (for the camcorder), and a plug suitable for connecting your TV on the other end.
- Copyright-protected images are not output from the HDMI OUT jack of your camcorder.
- Some TVs may not function correctly (e.g., no sound or image) with this connection.
- Do not connect the camcorder HDMI OUT jack to an external device HDMI OUT jack, as malfunction may result.
- When the connected device is compatible with 5.1ch surround sound, high definition image quality (HD) movies are output in 5.1ch surround sound automatically. Standard definition image quality (STD) movies are converted to 2ch sound.

To set the aspect ratio according to the connected TV (16:9/4:3)

- Set [TV Type] to [16:9] or [4:3] according to your TV.

When you connect with A/V connecting cable with S VIDEO

- When the S VIDEO plug (S VIDEO channel) is connected, audio signals are not output. To output audio signals, connect the white and red plugs to the audio input jack of your TV.
- This connection produces higher resolution images compared with the A/V connecting cable.

When your TV is monaural (When your TV has only one audio input jack)

- Connect the yellow plug of the A/V connecting cable to the video input jack and connect the white (left channel) or red (right channel) plug to the audio input jack of your TV or VCR.

When connecting to your TV via a VCR

- Connect your camcorder to the LINE IN input on the VCR using the A/V connecting cable. Set the input selector on the VCR to LINE (VIDEO 1, VIDEO 2, etc.).

Notes

- When you play back standard definition image quality (STD) movies on a 4:3 TV that is not compatible with the 16:9 signal, record movies with 4:3 aspect ratio. Touch MENU (MENU) → [Image Quality/Size] → [Wide Mode] → [4:3] → OK.

• When the A/V connecting cable is used to output movies, movies are output with standard definition image quality (STD).

If your TV/VCR has a 21-pin adaptor (EUROCONNECTOR)

Use a 21-pin adaptor (sold separately) to view playback pictures.

Tips

- If you connect your camcorder to the TV using more than one type of cable to output images, the order of priority of the TV input jacks is as follows:
  HDMI → component → S VIDEO → video
- HDMI (High Definition Multimedia Interface) is an interface to send both video/audio signals. The HDMI OUT jack outputs high quality images and digital audio.

On "Photo TV HD"

This camcorder is compatible with the "Photo TV HD" standard. "Photo TV HD" allows for highly-detailed, photo-like depiction of subtle textures and colors. By connecting Sony's Photo TV HD-compatible devices using an HDMI cable* or the component AV cable**, a whole new world of photos can be enjoyed in breathtaking high image quality.

* The TV will automatically switch to the appropriate mode when displaying photos.

** Setup of the TV will be necessary. Please refer to the instructions of your Photo TV HD-compatible TV for details.

Deleting movies and photos

You can free media space by deleting movies and photos from memory card.

Notes

- You cannot restore images once they are deleted. Save important movies and photos in advance.
- Do not remove the battery pack or the AC Adaptor from your camcorder while deleting the images. It may damage the memory card.
- Do not eject the memory card while deleting images from the memory card.
- You cannot delete protected movies and photos. Undo the protection of the movies and photos to delete them, before you try to delete them.

Tips

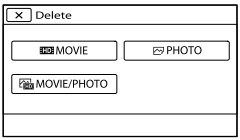
- You can delete the image using 🗑 on the playback screen.
- To delete all images recorded in the memory card, and recover all the recordable space of the media, format the media.
- Reduced-size images which enable you to view many images at the same time on an index screen are called “thumbnails.”

1 Press (View Images) button (p. 34).

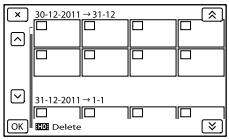
2 Touch MENU (MENU) → [Edit/Copy] → [Delete].

3 To select and delete movies, touch [Multiple Images] → [MOVIE]/[PHOTO]/[MOVIE/PHOTO].

- When [HD/ STD Setting] is set to [STD STD Quality], STD appears instead of HD.



4 Touch and display the ✓ mark on the movies or photos to be deleted.

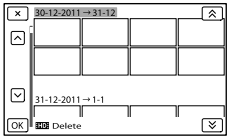


- Touch and hold the desired thumbnail so that you can confirm the image. Touch ✕ to return to the previous screen.

5 Touch OK → OK → OK.

To delete all movies/photos in an event at one time

① In step 3, touch [All In Event].



② Touch ∧/∨ to select the desired event, then touch OK.

- Touch and hold the desired thumbnail so that you can confirm the image. Touch ✕ to return to the previous screen.

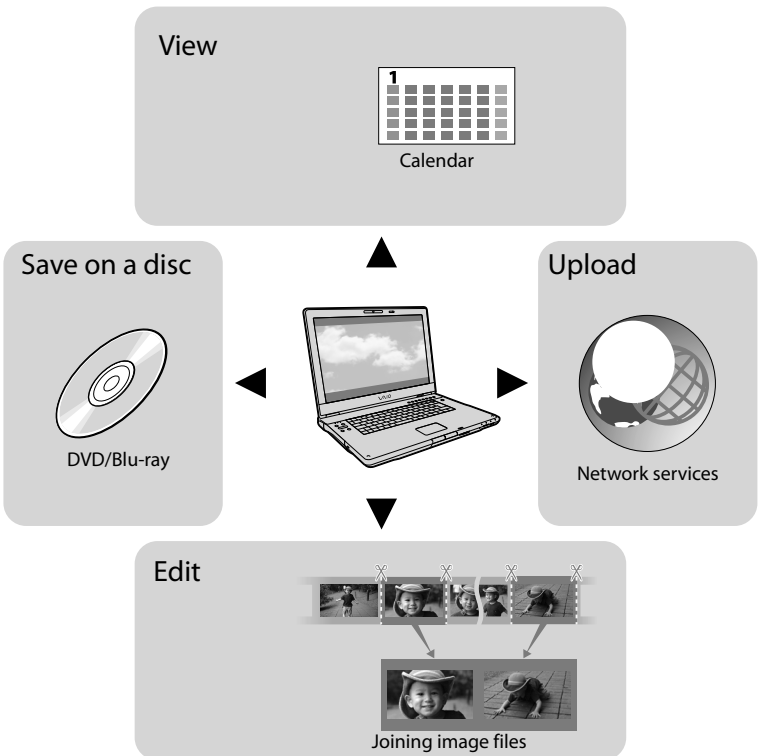
③ Touch OK → OK.

Useful functions available if you connect the camcorder to a computer

Editing and managing images on your computer (Windows)

The software PMB stored in the CD-ROM (supplied) includes functions that enable you to do more with the images recorded with the camcorder.

A movie that is divided and recorded in a series of one or more 2 GB files will be automatically combined in series into a single file by importing it to your computer using "PMB."



Preparing a computer

Step 1 Checking the computer system

Windows

OS*1
Microsoft Windows XP SP3*2/Windows Vista SP2*3/Windows 7 SP1
CPU
PMB: Intel Core Duo 1.66 GHz or faster, or Intel Core 2 Duo 1.66 GHz or faster (Intel Core 2 Duo 2.26 GHz or faster is required when processing FX or FH movies, and Intel Core 2 Duo 2.40 GHz or faster is required when processing PS movies.) However, Intel Pentium III 1 GHz or faster is sufficient for the following operations: – Importing the movies and photos to the computer – One Touch Disc Burn – Creating a Blu-ray disc/AVCHD recording disc/DVD-video (Intel Core Duo 1.66 GHz or faster is required when creating a DVD video by converting high definition image quality (HD) to standard definition image quality (STD).) – Copying a disc – Processing only the movies with standard definition image quality (STD) Image Data Converter: Pentium 4 or faster
Memory
PMB: For Windows XP: 512 MB or more (1 GB or more is recommended.) However, 256 MB or more is sufficient for processing only the movies with standard definition image quality (STD). For Windows Vista/Windows 7: 1 GB or more Image Data Converter: 1GB or more
Hard disk
Disk volume required for installation: Approximately 500 MB (10 GB or more may be necessary when creating AVCHD recording discs. 50 GB maximum may be necessary when creating Blu-ray discs.)
Display
Minimum 1,024 × 768 dots
Others
USB port (this must be provided as standard, Hi-Speed USB (USB 2.0 compatible)), Blu-ray disc/DVD burner (CD-ROM drive is necessary for installation) Either NTFS or exFAT file system is recommended as the hard disk file system.

Macintosh

OS*1
USB Connection: Mac OS X (v10.3, 10.4, 10.5, 10.6) “Image Data Converter Ver.4”: Mac OS X (v10.5, 10.6 (Snow Leopard))
Image Data Converter Ver.4
CPU: Intel Core Solo/Core Duo/Core 2 Duo or faster Memory: 1 GB or more is recommended. Display: 1,024 × 768 dots or more

*1 Standard installation is required. Operation is not assured if the OS has been upgraded or in a multi-boot environment.

*2 64-bit editions and Starter (Edition) are not supported. Windows Image Mastering API (IMAPI) Ver.2.0 or newer is required to use disc creation function, etc.

*3 Starter (Edition) is not supported.

Notes

- Operation with all computer environments is not assured.

When using a Macintosh

The supplied software “PMB” is not supported by Macintosh computers. To import the movies and photos to the computer, please contact Apple Inc.

Step 2 Installing the supplied software "PMB"

Install "PMB" before connecting your camcorder to a computer.
When you purchase this camcorder, install the supplied PMB to the newest state.

Notes
- Install the supplied "PMB" software, even if "PMB" software has already been installed on your computer.
- If the version of "PMB" installed on your computer is newer than the supplied "PMB" software, a message will be displayed. Stop the installation operation.

1 Confirm that your camcorder is not connected to the computer.

2 Turn on the computer.
- Log on as an Administrator for installation.
- Close all applications running on the computer before installing the software.

3 Place the supplied CD-ROM in the disc drive of your computer.

The installation screen appears.
- If the screen does not appear, click [Start] → [Computer] (in Windows XP, [My Computer]), then double-click [SONYPMB (E:)] (CD-ROM)*.

* Drive names (such as (E:)) may vary depending on the computer.

4 Click [Install].

5 Check that "PMB" and "Image Data Converter" are selected, then follow the instructions on the computer screen to continue the installation.

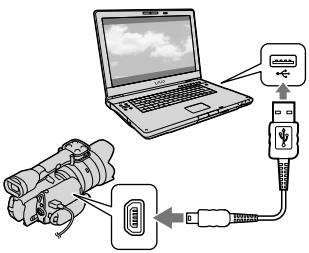
6 Select the country or region.

7 Select the language for the application to be installed, then proceed to the next screen.

8 Read the terms of the license agreement carefully. If you agree to the terms, change ○ to ◉, and then click [Next] → [Install].

9 Follow the instructions that appear on the computer screen to continue the installation.
- You may be required to install some other applications included on the disc at the same time. If the installation display appears, follow the instructions that appear on the screen.
- When you are required to restart the computer, follow the instructions that appear on the screen and restart it.
- Connect the camcorder to the computer when you are instructed to do so.

10 Connect the camcorder to the computer using the USB cable, then touch [USB Connect] on the LCD screen of the camcorder.



11 When the installation is completed, remove the CD-ROM from the computer.

- Click (PMB icon) that appears on the desktop of the computer to start up the software.

Notes

- To create discs or use other functions on Windows XP, Image Mastering API v2.0 for Windows XP should be installed. If Image Mastering API v2.0 for Windows XP has not been installed yet, select it from required programs on the installation screen and install it following the procedures displayed. (The computer must be connected to the internet for the installation.) You may install Image Mastering API v2.0 for Windows XP in response to the message displayed when you try to start those functions.
- Operation is not guaranteed if you read or write video data from or to the camcorder using software other than the supplied "PMB." For the information on the compatibility of the software you are using, consult the manufacturer of the software.

To disconnect your camcorder from the computer

① Click the icon at the bottom right of the desktop of the computer → [Safely remove USB Mass Storage Device].

② Touch [Cancel] → [Yes] on the camcorder screen.

③ Disconnect the USB cable.

- If you are using Windows 7, the icon may not appear on the desktop of the computer. In this case, you can disconnect the camcorder from your computer without following the procedures described above.

Notes

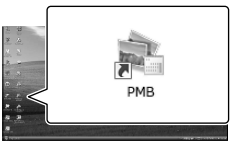
- Do not format the memory card of the camcorder using a computer. If you do this, the camcorder will not operate correctly.
- Do not insert AVCHD recording discs that have been created using the "PMB" software to DVD players or recorders, as these devices do not support the AVCHD standard. If you do, you may not be able to remove the disc from these devices.
- This camcorder captures high definition footage in the AVCHD format. Using the enclosed PC software, high definition footage can be copied onto DVD media. However, DVD media containing AVCHD footage should not be used with DVD based players or recorders, as the DVD player/recorder may fail to eject the media and may erase its contents without warning.
- When you access the camcorder from the computer, use the supplied software "PMB." Do not modify the files or folders on the camcorder from the computer. The image files may be damaged or may not be played back.
- Operation is not guaranteed, if you operate the data on the camcorder from the computer.
- The camcorder automatically divides an image file that exceeds 2 GB or larger and saves the parts as separate files. All image files may be

shown as separate files on a computer, however, the files will be handled properly by the import function of the camcorder or the "PMB" software.

- Use the supplied "PMB" software when you import long movies or edited images from the camcorder to a computer. If you use other software, the images may not be imported correctly.
- When you delete image files, follow the steps on page 41.
- You can create a Blu-ray disc by using a computer with a Blu-ray disc burner. Install the BD Add-on Software for "PMB."

Starting PMB (Picture Motion Browser)

1 Double-click the "PMB" short-cut icon on the computer screen.



The PMB software starts up.

2 Double-click the "PMB Help" short-cut icon on the computer screen to see how to use "PMB."

Notes

- If the icon is not displayed on the computer screen, click [Start] → [All Programs] → [PMB] → the desired item.

Tips

- Double-click "PMB Launcher" on the desktop of the computer. This allows you to start the desired function (application) by selecting one from a list of "PMB" functions.

Using “Image Data Converter”

With “Image Data Converter” you can do the following:

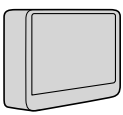
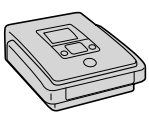
- To edit images recorded in RAW format with various corrections, such as tone curve, and sharpness.
- To adjust images with white balance, exposure, and creative style, etc.
- To save the images displayed and edited on a computer.
- You can either save the image as RAW format or save it in the general file format.
- To display and compare RAW/JPEG images recorded with this camera.
- To rate the images on a scale of five.
- To set color labels.

To use “Image Data Converter,” refer to Help.
Click [Start] → [All Programs] → [Image Data Converter] → [Help] → [Image Data Converter Ver.4].

“Image Data Converter” support page (English only)
http://www.sony.co.jp/ids-se/

Selecting a method for saving images with an external device

You can save high definition image quality (HD) movies using an external device. Select the method to be used according to the device.

External devices		Connecting cable	Page
	**External media device** Saving images on an external media device with high definition image quality (HD).	USB Adaptor Cable VMC-UAM1 (sold separately)	50
	**DVD writer (Except DVDirect Express)** Saving images on a DVD disc with high definition image quality (HD) or with standard definition image quality (STD).	USB cable (supplied)	53
	Hard disk recorder, etc. Saving images on a DVD disc with standard definition image quality (STD).	A/V connecting cable (supplied)	54

Movies that are recorded with standard definition image quality (STD)

Use the A/V connecting cable to connect the camcorder to an external device in which images are saved.

Notes

- The AVCHD recording disc can be played back only on AVCHD format compatible devices.
- Discs with high definition image quality (HD) images recorded should not be used in DVD players/recorders. Because DVD players/recorders are not compatible with the AVCHD format, DVD players/recorders may fail to eject the disc.

The types of media on which images are saved

Refer to “Selecting the recording mode” on page 32.

The devices on which the created disc can be played back

DVD disc with high definition image quality (HD)

AVCHD format playback devices, such as a Sony Blu-ray disc player or a PlayStation®3.

DVD disc with standard definition image quality (STD)

Ordinary DVD playback devices, such as a DVD player.

Notes

- Always maintain your PlayStation®3 to use the latest version of the PlayStation®3 system software.
- The PlayStation®3 may not be available in some countries/regions.

Saving images on an external media device

You can save movies and photos on an external media device (USB storage devices), such as an external hard disk drive. You can also play back images on the camcorder or another playback device.

Notes

- For this operation, you need the USB Adaptor Cable VMC-UAM1 (sold separately).
- The USB Adaptor Cable VMC-UAM1 may not be available in some countries/regions.
- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor (p. 14).
- Refer to the instruction manual supplied with the external media device.

Tips

- You can import images saved on the external media device to your computer by using the supplied software "PMB."

Functions available after saving images on an external media device

– playback of images through the camcorder (p. 52)
– importing images to "PMB"

Devices that cannot be used as an external media device

- You cannot use the following devices as an external media device.
  – media devices with a capacity exceeding 2 TB
  – ordinary disc drive such as CD or DVD drive
  – media devices connected via a USB hub
  – media devices with built-in USB hub
  – card reader

Notes

- You may not be able to use external media devices with a code function.
- The FAT file system is available for your camcorder. If the storage medium of the external device was formatted for the NTFS file system, etc., format the external media device using the camcorder before use. The format screen appears when an external media device is connected to your camcorder. Make sure that important data has not previously been saved on the external media device before you format it using the camcorder.
- Operation is not assured with every device satisfying requirements for operating.
- For details on available external media devices, go to the Sony support website in your country/region.

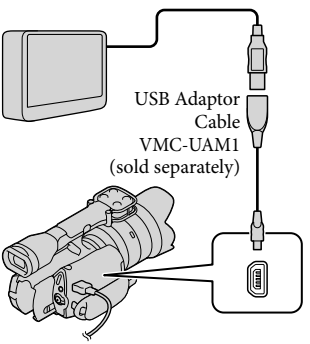
1 Connect the AC Adaptor and the power cord (mains lead) to the DC IN jack of your camcorder and the wall outlet (wall socket).

2 If the external medium device has the AC power cable, connect it to the wall outlet (wall socket).

3 Connect the USB Adaptor Cable to the external media device.

4 Connect the USB Adaptor Cable to the ♆ (USB) jack of your camcorder.

Make sure not to disconnect the USB cable while [Preparing image database file. Please wait.] is displayed on the LCD screen. If [Repair Img. DB F.] is displayed on the camcorder screen, touch OK.



5 Connect the external media device to the camcorder and touch [Copy.] on the camcorder screen.

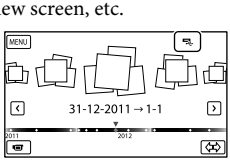
Movies and photos that are stored in the memory card and that have not yet been saved on external media device can be saved on the connected media device at this time.

- This operation is available only when there are newly recorded images.

6 After operation is completed, touch OK on the camcorder screen.

When connecting an external media device

The images saved in the external media device are displayed on the LCD screen. When an external media device is connected, the USB icon will appear on the Event View screen, etc.



You can make menu settings of the external media device such as deleting images. Touch MENU (MENU) → [Edit/Copy] on Event View.

To disconnect the external media device

① Touch while the camcorder is in the playback standby mode ([Event View] or Event Index is displayed) of the external media device.

② Disconnect the USB Adaptor Cable.

Notes

- The number of scenes you can save on the external media device are as follows. However, even if the external media device has free space, you cannot save scenes exceeding the following number.
  - – High definition image quality (HD) movies: Max. 3,999
  - – Standard definition image quality (STD) movies: Max. 9,999
  - – Photos: Max. 40,000

  The number of scenes may be smaller depending on the type of images recorded.

Saving desired movies and photos

You can save desired images in the camcorder to the external media device.

1 Connect the camcorder to the external media device and touch [Play without copying.].

Event View of the external medium is displayed.

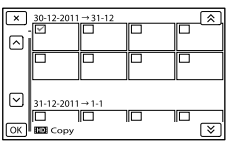
2 Touch MENU (MENU) → [Edit/Copy] → [Copy].

3 Follow the instructions that appear on the screen to select image selection methods and type of the image.

You cannot copy images from an external media device to the internal recording medium on the camcorder.

4 When you selected [Multiple Images], touch the image to be saved.

✔ appears.



- Press and hold the image down on the LCD screen to confirm the image. Touch ✕ to return to the previous screen.
- If you select [All In Event], select the event to copy with ⌃⌃ / ⌄⌄. You cannot select multiple events.

5 Touch OK → OK → OK on the camcorder screen.

Playing back images in the external media device on the camcorder

1 Connect the camcorder to the external media device and touch [Play without copying.].

Event View of the external media device is displayed.

2 Select the image you want to view and play back the image (p. 34).

- You can also view images on a TV connected to your camcorder (p. 38).
- You can play back the high definition image quality (HD) movies on your computer using [Player for AVCHD]. Start [Player for AVCHD], and select the drive where the external media device is connected with [Settings].

To perform [Direct Copy] manually

You can perform [Direct Copy] manually while the camcorder is connected to an external media device.

① Touch MENU (MENU) → [Edit/Copy] → [Direct Copy] on the [Event View] screen of the external media device.
② Touch [Copy images that have not been copied.].
③ Touch OK → OK.

Notes

- If your camcorder does not recognize the external media device, try the following operations.
  - Reconnect the USB Adaptor Cable to your camcorder.
  - If the external media device has the AC power cord (mains lead), connect it to the wall outlet (wall socket).

Creating a high definition image quality (HD) disc with such as a Sony DVD writer, etc.

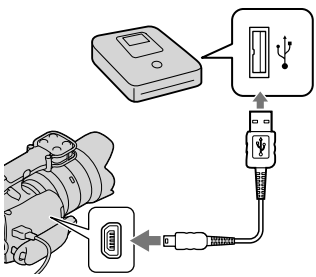
Use the USB cable to connect your camcorder to a disc creation device, which is compatible with high definition image quality (HD) movies, such as a Sony DVD writer. Refer also to the instruction manuals supplied with the device to be connected.

Notes

- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor for this operation (p. 14).
- Sony DVD writer may not be available in some countries/regions.
- Your camcorder is not compatible with DVDirect Express.

1 Connect the AC Adaptor and the power cord (mains lead) to the DC IN jack of your camcorder and the wall outlet (wall socket) (p. 14).

2 Turn on your camcorder, and connect a DVD writer, etc. to your camcorder with the USB cable (supplied).



The [USB Select] screen appears on the camcorder screen.

- If the [USB Select] screen does not appear, touch MENU (MENU) → [Setup] → [⇄ (⇄ Connection)] → [USB Connect].

3 Touch [USB Connect] on the camcorder screen.

- The displayed recording media differ depending on the model.

4 Record movies on the connected device.

- For details, refer to the instruction manuals supplied with the device to be connected.

5 After the operation is completed, touch ✕ → OK on the camcorder screen.

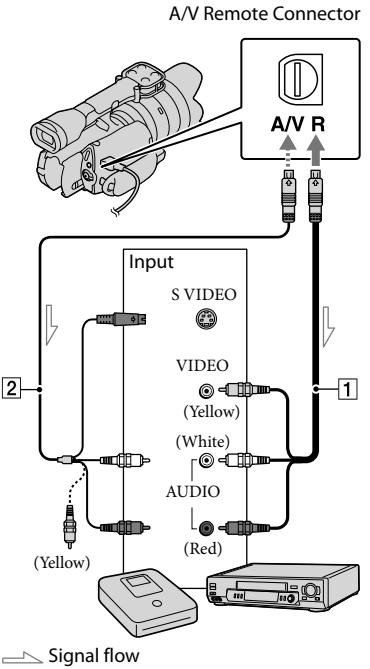
6 Disconnect the USB cable.

Creating a standard definition image quality (STD) disc with a recorder, etc.

You can copy images played back on your camcorder on a disc or video cassette, by connecting your camcorder to a disc recorder, a Sony DVD writer, etc., other than DVDirect Express, with the A/V connecting cable. Connect the device in either way of 1 or 2. Refer also to the instruction manuals supplied with the devices to be connected.

Notes

- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor for this operation (p. 14).
- Sony DVD writer may not be available in some countries/regions.
- High definition image quality (HD) movies will be copied with standard definition image quality (STD).



1 A/V connecting cable (supplied)

2 A/V connecting cable with S VIDEO (sold separately)
By using this cable, higher quality images can be produced than with an A/V connecting cable. Connect the white and red plug (left/right audio) and the S VIDEO plug (S VIDEO channel) of the A/V connecting cable with an S VIDEO cable. If you connect the S VIDEO plug only, you will hear no sound. The yellow plug (video) connection is not necessary.

1 Insert the recording media in the recording device.

- If your recording device has an input selector, set it to the input mode.

2 Connect your camcorder to the recording device (a disc recorder, etc.) with the A/V connecting cable 1 (supplied) or an A/V connecting cable with S VIDEO 2 (sold separately).

- Connect your camcorder to the input jacks of the recording device.

3 Start playback on your camcorder, and record it on the recording device.

- Refer to the instruction manuals supplied with your recording device for details.

4 When dubbing is finished, stop the recording device, and then your camcorder.

Notes

- Since copying is performed via analog data transfer, the image quality may deteriorate.
- You cannot copy images to recorders connected with an HDMI cable.
- To copy date/time information and camera data, touch MENU (MENU) → [Setup] → [▶] ([▶] Playback Settings)] → [Data Code] → a desired setting → OK.
- When the screen size of display devices (TV, etc.) is 4:3, touch MENU (MENU) → [Setup] → [⇄ (⇄ Connection)] → [TV Type] → [4:3] → OK.
- When you connect a monaural device, connect the yellow plug of the A/V connecting cable to the video input jack, and the white (left channel) or the red (right channel) plug to the audio input jack on the device.

Using menus

You can enjoy using your camcorder more by making good use of menu operations.
The camcorder has various menu items under each of 6 menu categories.

Shooting Mode (Items for selecting a shooting mode) → p. 57

Camera/Mic (Items for customized shooting) → p. 57

Image Quality/Size (Items for setting up image quality or size) → p. 58

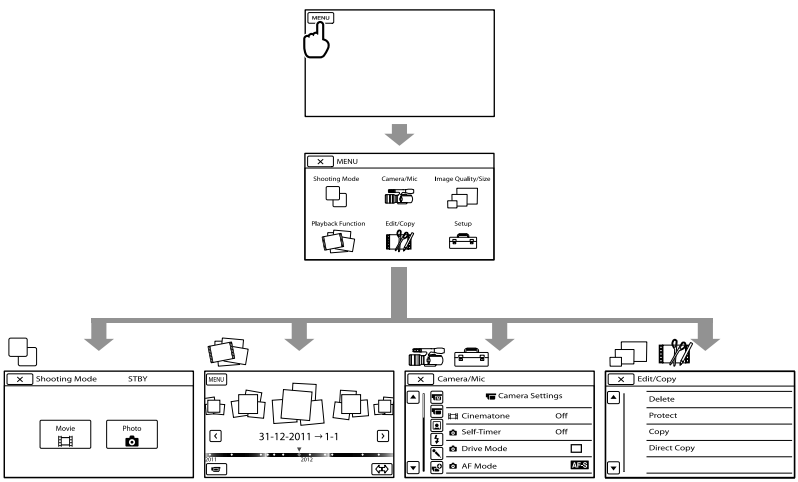
Playback Function (Items for playback) → p. 34

Edit/Copy (Items for editing) → p. 58

Setup (Other setup items) → p. 58

Operating menus

Follow the procedures explained below to set the menu items.



The [Camera/Mic] and [Setup] menus have sub-categories. Touch the sub-category icon, and the screen changes to other sub-category menus.
Grayed out menu items or settings are not available.

Notes

- You may not be able to set some menu items, depending on the recording or playback conditions.
- Touch [×] to finish setting the menu or to return to the previous menu screen.

Menu lists

Shooting Mode

Movie ..... Records movies.
Photo ..... Shoots photos.

Camera/Mic

(Manual Settings)
- White Balance ..... Adjusts the color balance to the brightness of the recording environment.
- Spot Meter/Fcs ..... Adjusts the brightness and focus for the selected subject simultaneously.
- Spot Meter ..... Adjusts the brightness of images to a subject you touch on the screen.
- Spot Focus ..... Focuses on a subject you touch on the screen.
- Exposure ..... Adjusts the brightness of movies and photos.
  - Gain ..... Sets Gain.
  - ISO ..... Sets the luminous sensitivity for recording still images.
- AE Shift ..... Adjusts the exposure. Touch + if the subject is white or the backlight is bright, or touch − if the subject is black or the light is dim.
- White Balance Shift ..... Adjusts the white balance.

(Camera Settings)
- Cinematone ..... Adjusts the color of the movie to resemble the atmosphere of films when recording.
- Self-Timer ..... Sets the self-timer when your camcorder is in photo recording mode.
- Drive Mode ..... Sets continuous or bracket shooting, etc.
- AF Mode ..... Selects the focus method.
- SteadyShot ..... Sets the SteadyShot function when recording movies.
- SteadyShot ..... Sets the SteadyShot function when shooting photos.
- Auto Back Light ..... Adjusts the exposure for backlit subjects automatically.
- MANUAL Button ..... Assigns a function to the MANUAL button.

(Face)
- Face Detection ..... Adjusts the image quality of the face(s) automatically.

(Flash)
- Flash ..... Sets how the flash is activated.
- Flash Level ..... Sets the brightness of flash.
- Red Eye Reduction ..... Prevents redeye when shooting with flash.

(Microphone)
- Wind Noise Reduct. ..... Reduces the wind noise.
- Audio Mode ..... Sets the recording sound format (5.1ch surround/2ch stereo).
- Audio Rec Level ..... Adjusts the audio level when recording.

(Shooting Assist)
- Guide Frame ..... Displays the frame to make sure the subject is horizontal or vertical.
- Zebra ..... Displays a zebra pattern as a guide for adjusting brightness.
- Peaking ..... Displays an image on the LCD screen with its outlines enhanced.
- Histogram ..... Displays the Histogram.

Camera Data Display.... Displays the value of iris, gain (ISO) and shutter speed.
Audio Level Display..... Displays the audio level meter on the LCD screen.
AF Micro Adjustment... Adjusts the focus for the attached lens.

Image Quality/Size

REC Mode ..... Sets the mode to record movies. When recording fast moving subject, a high image quality is recommended.
Frame Rate ..... Sets the frame rate to record movies.
HD / STD Setting..... Sets image quality for recording, playback, or editing movies.
Wide Mode ..... Sets the horizontal to vertical ratio when recording movies with standard definition image quality (STD).
Image Size ..... Sets the photo size.
RAW/JPEG..... Selects the compression format of still images.

Playback Function ..... Enables you to view recorded movies/photos (p. 34).

Edit/Copy

Delete..... Deletes movies or photos.
Protect ..... Protects movies or photos to avoid deleting.
Copy ..... Selects and copies movies or photos to external media.
Direct Copy ..... Copies images stored on the recording medium to some type of external media.

Setup

(Media Settings)
Media Info..... Displays information on the recording media, such as free space.
Format..... Deletes all data on the recording media.
Repair Img. DB F..... Repairs the image database file on the recording media (p. 62).
File Number..... Sets how to assign the file number.
(Playback Settings)
Data Code ..... Sets the date and time.
Volume..... Adjusts the volume of playback sound (p. 36).
(Connection)
TV Type ..... Converts the signal depending on the TV connected (p. 38).
Component Output ..... Select this option when you connect your camcorder to a TV with the component input jack (p. 39).
HDMI Resolution ..... Selects the output image resolution when connecting your camcorder to a TV with an HDMI cable (sold separately).
CTRL FOR HDMI ..... Sets whether or not the TV's Remote Commander is to be used when the camcorder is connected to a "BRAVIA" Sync compatible TV with the HDMI cable (sold separately).
USB Connect..... Selects which type of media on the camcorder is to be used when the camcorder is connected to an external device via USB.
USB Connect Setting ... Sets the connection mode when the camcorder is connected to a computer or a USB device.
Disc Burn ..... Allows you to save images onto discs by a single press of a button.

(General Settings)

Beep ..... Sets whether the camcorder sounds operation beeps or not.

LCD Brightness ..... Adjusts the brightness of the LCD screen.

VF Brightness ..... Adjusts the brightness of the viewfinder.

Display Setting ..... Sets the duration that icons or indicators are displayed on the LCD screen.

REC Lamp ..... Turns off the recording lamp on the front of your camcorder.

Shooting w/o Lens ..... Sets whether or not the recording can be started when no lens is attached.

Remote Ctrl ..... Sets whether the Wireless Remote Commander is to be used or not.

A. Shut Off ..... Sets your camcorder to turn off automatically (p. 15).

Language Setting ..... Sets the display language (p. 23).

Calibration ..... Calibrates the touch panel.

Battery Info ..... Displays the battery information.

Version ..... Displays the version of your camcorder and the lens.

(Clock Settings)

Date & Time Setting ..... Sets the [Date & Time], [Summer Time], or [Date & Time Format] (p. 21).

Area Setting ..... Adjusts for a time difference without stopping the clock (p. 21).

Getting detailed information from the “Handycam” Handbook

The “Handycam” Handbook is a user guide designed to be read on a computer screen. The “Handycam” Handbook is intended to be read when you want to know more about operating your camcorder.

1 To install the “Handycam” Handbook on a Windows computer, place the supplied CD-ROM in the disc drive of your computer.

The installation screen appears.

- If the screen does not appear, click [Start] → [Computer] (in Windows XP, [My Computer]), then double- click [SONYPMB(E:)] (CD- ROM)* → [install.exe].

* Drive names (such as (E:)) may vary depending on the computer.

2 Click [Handbook].

3 Click the desired language and the model name of your camcorder → [Install], and follow the on- screen instructions to install “Handycam” Handbook.

- The model name of your camcorder is printed on the bottom surface.

To view the “Handycam” Handbook, double-click the short-cut icon on the computer screen.

- When using a Macintosh, open the [Handbook] – [GB] folder in the CD-ROM, then copy [Handbook.pdf].
- You need Adobe Reader to read “Handycam” Handbook. If it is not installed on your computer, you can download it from the Adobe Systems web page: http://www.adobe.com/
- Refer to “PMB Help” for details on the supplied software “PMB” (p. 44).

Troubleshooting

If you run into any problems using your camcorder, follow the steps below.

① Check the list (p. 61 to 63), and inspect your camcorder.

↓

② Remove the power source, attach the power source again after about 1 minute, and turn the camcorder on.

↓

③ Press RESET (p. 73) using a pointed object, and turn the camcorder on. If you press RESET, all settings, including the clock setting, are reset.

↓

④ Contact your Sony dealer or local authorized Sony service facility.

- See the "Handycam" Handbook (p. 60) for details on the symptoms of your camcorder, and "PMB Help" (p. 46) on connecting your camcorder to a computer.

The power does not turn on.

- Attach a charged battery pack to the camcorder (p. 13).
- Connect the plug of the AC Adaptor to the wall outlet (wall socket) (p. 14).

The camcorder does not operate even when the power is set to on.

- It takes a few seconds for your camcorder to be ready to shoot after the power is turned on. This is not a malfunction.
- Disconnect the AC Adaptor from the wall outlet (wall socket) or remove the battery pack, then reconnect it after about 1 minute. If your camcorder still does not work, press RESET (p. 73) using a pointed object. (If you press RESET, all settings, including the clock setting, are reset.)
- The temperature of your camcorder is extremely high. Turn off the camcorder and leave it for a while in a cool place.
- The temperature of your camcorder is extremely low. Leave the camcorder with the power turned on. If you still cannot operate your camcorder, turn off the camcorder and take it to a warm place. Leave the camcorder there for a while, then turn on the camcorder.

Your camcorder gets warm.

- Your camcorder may become warm during operation. This is not a malfunction.

The power abruptly turns off.

- Use the AC Adaptor (p. 14).
- Turn on the power again.
- Charge the battery pack (p. 13).

Pressing START/STOP or PHOTO does not record images.

- Press MODE to turn on the (Movie) or (Photo) lamp.
- Your camcorder is recording the image you have just shot on the memory card. You cannot make any new recordings during this period.
- The recording media is full. Delete unnecessary images (p. 41).
- Total number of movie scenes or photos has exceeded the recordable capacity of your camcorder (p. 64). Delete unnecessary images (p. 41).

The recording stops.

- The temperature of your camcorder is extremely high/low. Turn off your camcorder and leave it for a while in a cool/warm place.

"PMB" cannot be installed.

- Check the computer environment or installation procedure required to install "PMB" (p. 43).

"PMB" does not work correctly.

- Quit "PMB" and restart your computer.

The camcorder is not recognized by the computer.

- Disconnect devices from the USB jack of the computer other than the keyboard, mouse, and your camcorder.
- Disconnect the USB cable from the computer and your camcorder, and restart the computer, then connect the computer and your camcorder again in an orderly manner.

Self-diagnosis display/Warning indicators

If indicators appear on the LCD screen or viewfinder, check the following.
If the problem persists even after you have tried to fix a couple of times, contact your Sony dealer or local authorized Sony service facility. In this case, when you contact them, give them all the numbers of the error code beginning with C or E.

C:04:☐☐

- The battery pack is not an "InfoLITHIUM" battery pack V series. Use an "InfoLITHIUM" battery pack (V series) (p. 13).
- Connect the DC plug of the AC Adaptor to your camcorder securely (p. 13).

C:06:☐☐

- The battery pack temperature is high. Change the battery pack or place it in a cool place.

C:13:☐☐ / C:32:☐☐

- Remove the power source. Reconnect it and operate your camcorder again.

E:☐☐:☐☐

- Follow the steps from ② on page 61.

- Battery power is low.

- The battery pack temperature is high. Change the battery pack or place it in a cool place.

- No memory card is inserted (p. 27).
- When the indicator flashes, there is not enough free space for recording images. Delete unnecessary images (p. 41), or format the memory card after storing the images on other media.
- The Image Database File is damaged. Check the data base file by touching MENU (MENU) → [Setup] → [Repair Img. DB F.].

- The memory card is damaged. Format the memory card with your camcorder (p. 58).

- Incompatible memory card is inserted (p. 28).

- The memory card is write-protected.
- Access to the memory card was restricted on another device.

(Warning indicator pertaining to the external media device)

- The image database file may be damaged. Check the database file by touching MENU (MENU) → [Setup] → [Repair Img. DB F.]
- The external media device is damaged.

(Warning indicator pertaining to formatting of the external media device)

- The external media device is damaged.
- The external media device is not formatted correctly.

- The camcorder is unsteady. Hold the camcorder steady with both hands. However, note that the camera-shake warning indicator does not disappear.

- The memory card is full. Delete unnecessary images (p. 41).
- Photos cannot be recorded during processing. Wait for a while, then record.

Recording time of movies/number of recordable photos

"HD" stands for high definition image quality, and "STD" stands for standard image quality.

Expected time of recording and playback with each battery pack

Recording time

Approximate time available when you use a fully charged battery pack.

(unit: minute)

Battery pack	Continuous recording time		Typical recording time	
Image quality	HD	STD	HD	STD
NP-FV70	175	185	95	100
(supplied)	190	205	105	110
NP-FV100	350	370	190	205
	385	405	210	220

- Top: When recording with the LCD screen
  Bottom: When recording with viewfinder
- Each recording time is measured under the following conditions.
  – [REC Mode]: Standard HQ (default setting)
  – Using E 18-200mm F3.5–6.3 OSS lens
- Typical recording time shows the time when you repeat recording start/stop, switching the MODE lamp, and zooming.
- Times measured when using the camcorder at 25 °C (77 °F). 10 °C to 30 °C (50 °F to 86 °F) is recommended.
- The recording and playback time will be shorter when you use your camcorder in low temperatures.
- The recording and playback time will be shorter depending on the conditions under which you use your camcorder.

Playing time

Approximate time available when you use a fully charged battery pack.

(unit: minute)

Battery pack		
Image quality	HD	STD
NP-FV70 (supplied)	325 415	355 440
NP-FV100	650 830	710 870

- Top: When recording with the LCD screen
  Bottom: When recording with viewfinder

Expected recording time of movies

High definition image quality (HD)

(unit: minute)

	2 GB	4 GB	8 GB	16 GB	32 GB
PS	9 (9)	15 (15)	35 (35)	75 (75)	150 (150)
FX	10 (10)	20 (20)	40 (40)	90 (90)	180 (180)
FH	10 (10)	30 (30)	60 (60)	120 (120)	245 (245)
HQ	25 (20)	50 (40)	105 (80)	215 (165)	440 (330)
LP	45 (35)	90 (75)	190 (155)	380 (310)	770 (630)

Standard definition image quality (STD)

(unit: minute)

	2 GB	4 GB	8 GB	16 GB	32 GB
HQ	25 (25)	55 (50)	110 (100)	225 (210)	460 (420)

- When [Audio Mode] is set to 2ch (p. 57).

Notes

- When using Sony memory card.
- The recordable time may vary depending on the recording and subject conditions and [REC Mode] and [Frame Rate] (p. 58).
- The number in ( ) is the minimum recordable time.

Tips

- Your camcorder uses the VBR (Variable Bit Rate) format to automatically adjust image quality to suit the recording scene. This technology causes fluctuations in the recording time of the media. Movies containing quickly moving and complex images are recorded at a higher bit-rate, and this reduces the overall recording time.

Expected number of recordable photos

	JPEG	RAW	RAW & JPEG
2 GB	295	105	80
4 GB	590	215	155
8 GB	1150	440	320
16 GB	2400	880	640
32 GB	4800	1750	1250

- When [Image Size] is set to [3:2 16.0M].
- When using Sony memory card.
- The selected image size is effective when the (Photo) lamp is lit.
- The number of recordable photos of memory card shown is for the maximum image size of your camcorder. The actual number of recordable photos is displayed on the LCD screen during recording (p. 70).
- The number of recordable photos of memory card may vary depending on the recording conditions.

Tips

- You can also use memory card with a capacity of under 1 GB for recording photos.
- The following list shows the bit-rate, pixels and aspect ratio of each recording mode (movie +

audio, etc.).
– High definition image quality (HD):
PS: Max. 28 Mbps 1,920 × 1,080 pixels/16:9
FX: Max. 24 Mbps 1,920 × 1,080 pixels/16:9
FH: Approx. 17 Mbps (average) 1,920 × 1,080 pixels/16:9
HQ: Approx. 9 Mbps (average) 1,440 × 1,080 pixels/16:9
LP: Approx. 5 Mbps (average) 1,440 × 1,080 pixels/16:9
– Standard definition image quality (STD):
HQ: Approx. 9 Mbps (average) 720 × 576 pixels/16:9, 4:3
• The photo recording pixels and the aspect ratio.
– Photo recording mode:
4,912 × 3,264 dots/3:2
4,912 × 2,760 dots/16:9
3,568 × 2,368 dots/3:2
3,568 × 2,000 dots/16:9
2,448 × 1,624 dots/3:2
2,448 × 1,376 dots/16:9
– Capturing a photo from a movie:
1,920 × 1,080 dots/16:9
640 × 360 dots/16:9
640 × 480 dots/4:3

On use and care

• Do not use or store the camcorder and accessories in the following locations:
– Anywhere extremely hot, cold or humid. Never leave them exposed to temperatures above 60 °C (140 °F), such as under direct sunlight, near heaters or in a car parked in the sun. They may malfunction or become deformed.
– Near strong magnetic fields or mechanical vibration. The camcorder may malfunction.
– Near strong radio waves or radiation. The camcorder may not be able to record properly.
– Near AM receivers and video equipment. Noise may occur.
– On a sandy beach or anywhere dusty. If sand or dust gets in your camcorder, it may malfunction. Sometimes this malfunction cannot be repaired.
– Near windows or outdoors, where the LCD screen, the viewfinder or the lens may be exposed to direct sunlight. This damages the inside of the viewfinder or the LCD screen.
• Operate your camcorder on DC 6.8 V/7.2 V (battery pack) or DC 8.4 V (AC Adaptor).
• For DC or AC operation, use the accessories recommended in these operating instructions.
• Do not let your camcorder get wet, for example, from rain or sea water. If your camcorder gets wet, it may malfunction. Sometimes this malfunction cannot be repaired.
• If any solid object or liquid gets inside the casing, unplug your camcorder and have it checked by a Sony dealer before operating it any further.
• Avoid rough handling, disassembling, modifying, physical shock, or impact such as hammering, dropping or stepping on the product. Be particularly careful of the lens.
• Keep the camcorder turning off when you are not using your camcorder.
• Do not wrap your camcorder with a towel, for example, and operate it. Doing so might cause heat to build up inside.
• When disconnecting the power cord (mains lead), pull it by the plug and not the cord (lead).
• Do not damage the power cord (mains lead) such as by placing anything heavy on it.

- Do not use a deformed or damaged battery pack.
- Keep metal contacts clean.
- If the battery electrolytic liquid has leaked:
  – Consult your local authorized Sony service facility.
  – Wash off any liquid that may have contacted your skin.
  – If any liquid gets in your eyes, wash with plenty of water and consult a doctor.

When not using your camcorder for a long time

- To keep your camcorder in optimum state for a long time, turn it on and let it run by recording and playing back images about once a month.
- Use up the battery pack completely before storing it.

LCD screen

- Do not exert excessive pressure on the LCD screen, as it may cause damage.
- If your camcorder is used in a cold place, a residual image may appear on the LCD screen. This is not a malfunction.
- While using your camcorder, the back of the LCD screen may heat up. This is not a malfunction.

To clean the LCD screen

- If fingerprints or dust make the LCD screen dirty, it is recommended that you use a soft cloth to clean it.

On handling the casing

- If the casing is soiled, clean the camcorder body with a soft cloth lightly moistened with water, and then wipe the casing with a dry soft cloth.
- Avoid the following to avoid damage to the finish:
  – Using chemicals such as thinner, benzine, alcohol, chemical cloths, repellent, insecticide and sunscreen
  – Handling the camcorder with above substances on your hands
  – Leaving the casing in contact with rubber or vinyl objects for a long period of time

About care and storage of the lens

- Wipe the surface of the lens clean with a soft cloth in the following instances:
  – When there are fingerprints on the lens surface
  – In hot or humid locations
  – When the lens is exposed to salty air such as at the seaside
- Store in a well-ventilated location subject to little dirt or dust.
- To prevent mold, periodically clean the lens as described above.

On charging the pre-installed rechargeable battery

Your camcorder has a pre-installed rechargeable battery to retain the date, time, and other settings even when the camcorder is turned off. The pre-installed rechargeable battery is always charged while your camcorder is connected to the wall outlet (wall socket) via the AC Adaptor or while the battery pack is attached. The rechargeable battery will be fully discharged in about 3 months if you do not use your camcorder at all. Use your camcorder after charging the pre-installed rechargeable battery. However, even if the pre-installed rechargeable battery is not charged, the camcorder operation will not be affected as long as you are not recording the date.

Procedures

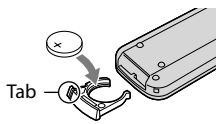
Connect your camcorder to a wall outlet (wall socket) using the supplied AC Adaptor, and leave it for more than 24 hours.

Note on disposal/transfer of memory card

Even if you delete data in the memory card or format the memory card on your camcorder or a computer, you may not delete data from the memory card completely. When you give the memory card to somebody, it is recommended that you delete data completely using data deletion software on a computer. Also, when you dispose of the memory card, it is recommended that you destroy the actual body of the memory card.

To change the battery of the Wireless Remote Commander

① While pressing on the tab, inset your fingernail into the slit to pull out the battery case.
② Place a new battery with the + side facing up.
③ Insert the battery case back into the Wireless Remote Commander until it clicks.



WARNING

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

- When the lithium battery becomes weak, the operating distance of the Wireless Remote Commander may shorten, or the Wireless Remote Commander may not function properly. In this case, replace the battery with a Sony CR2025 lithium battery. Use of another battery may present a risk of fire or explosion.

System

Signal format: PAL color, CCIR standards
HDTV 1080/50i, 1080/50p specification

Movie recording format:
HD: MPEG-4 AVC/H.264 AVCHD format Ver.2.0 compatible
STD: MPEG2-PS

Audio recording system:
Dolby Digital 2ch/5.1ch
Dolby Digital 5.1 Creator

Photo file format
DCF Ver.2.0 Compatible
Exif Ver.2.3 Compatible
MPF Baseline Compatible

Recording media (Movie/Photo)
"Memory Stick PRO Duo" media
SD card (Class 4 or faster)

Viewfinder
Electric viewfinder: Color
Screen size: 1.1 cm (0.43 type)
Effective pixel number: 1 152 000 dots (800 × 3[RGB] × 480)

Image device: 23.5 mm × 15.6 mm (APS-C type)
CMOS sensor
Recording pixels (still 3:2 JPEG):
Max. 16.0 mega (4 912 × 3 264) pixels
Gross: Approx. 16 700 000 pixels
Effective (movie, 16:9)
Approx. 13 600 000 pixels
Effective (photo, 16:9):
Approx. 13 600 000 pixels
Effective (photo, 3:2):
Approx. 16 100 000 pixels

Color temperature: [Auto], [One Push], [Indoor] (3 200 K), [Outdoor] (5 800 K)

Minimum illumination
9 lx (lux) (in default setting, shutter speed 1/50 second, gain: 30 dB, aperture F3.5)

Input/Output connectors

A/V Remote Connector: Component/video and audio output jack

HDMI OUT jack: HDMI mini connector

USB jack: mini-AB

Headphone jack: Stereo minijack (ϕ 3.5 mm)

MIC input jack: Stereo minijack (ϕ 3.5 mm)

LCD screen

Picture: 7.5 cm (3.0 type, aspect ratio 16:9)

Total number of pixels: 921 600 (1 920 × 480)

General

Power requirements: DC 6.8 V/7.2 V (battery pack) DC 8.4 V (AC Adaptor)

Average power consumption:
During camera recording using viewfinder at normal brightness:
During camera recording using E 18-200mm F3.5–6.3 OSS lens*:
HD: 4.0 W STD: 3.8 W
During camera recording using LCD screen at normal brightness:
During camera recording using E 18-200mm F3.5–6.3 OSS lens*:
HD: 4.4 W STD: 4.2 W

* Supplied with NEX-VG20EH

Operating temperature: 0 °C to 40 °C (32 °F to 104 °F)

Storage temperature: –20 °C to + 60 °C (–4 °F to +140 °F)

Dimensions (approx.):
91 mm × 130 mm × 223 mm (3 5/8 in. × 5 1/8 in. × 8 3/4 in.) (w/h/d) including the projecting parts
102 mm × 132 mm × 294 mm (4 1/8 in. × 5 1/4 in. × 11 1/2 in.) (w/h/d) including the projecting parts, and the supplied E 18-200mm F3.5–6.3 OSS lens*

* Supplied with NEX-VG20EH

Mass (approx.)
Camcorder body only:
Approx. 645 g (1 lb 6 oz)
When recording:
Approx. 1 290 g (2 lb 13 oz)
(With the accessories lens*, lens hood*, "Memory Stick PRO Duo" media supplied battery pack (NP-FV70), large eyecup and Wind Screen)

* Supplied with NEX-VG20EH

AC Adaptor AC-L200C/AC-L200D

Power requirements: AC 100 V - 240 V, 50 Hz/60 Hz

Current consumption: 0.35 A - 0.18 A

Power consumption: 18 W

Output voltage: DC 8.4 V*

Operating temperature: 0 °C to 40 °C (32 °F to 104 °F)

Storage temperature: –20 °C to + 60 °C (–4 °F to +140 °F)

Dimensions (approx.): 48 mm × 29 mm × 81 mm (1 15/16 in. × 1 3/16 in. × 3 1/4 in.) (w/h/d) excluding the projecting parts

Mass (approx.): 170 g (6.0 oz) excluding the power cord (mains lead)

* See the label on the AC Adaptor for other specifications.

Rechargeable battery pack NP-FV70

Maximum output voltage: DC 8.4 V

Output voltage: DC 6.8 V

Maximum charge voltage: DC 8.4 V

Maximum charge current: 3.0 A

Capacity
Typical: 14.0 Wh (2 060 mAh)
Minimum: 13.0 Wh (1 960 mAh)

Type: Li-ion

E18-200 mm F3.5-6.3 OSS (supplied with NEX-VG20EH)

Lens:E-mount lens

When converted to a 35 mm still camera
29 mm ~ 322 mm (1 3/16 in. ~ 12 3/4 in.) (16:9 movie)
27 mm ~ 300 mm (1 1/8 in. ~ 11 7/8 in.) (3:2 still image)

F-value
F3.5 ~ F6.3

SteadyShot
Optical-shift biaxial-linear-drive and hall effect sensor

Minimum focus*
0.30 m (W) ~ 0.50 m (T) (11 7/8 in. ~ 19 3/4 in.)

Maximum magnification
× 0.35

Minimum f-stop
f/22 ~ f/40

Filter diameter
67 mm (2 3/4 in.)

Dimensions (max. diameter × height)
Approx. 75.5 mm × 99.0 mm (Approx. 3 in. × 4 in.)

Mass
Approx. 524 g (Approx. 18 1/2 oz.)

* Minimum focus is the shortest distance from the image sensor to the subject.

Design and specifications of your camcorder and accessories are subject to change without notice.

- Manufactured under license from Dolby Laboratories.

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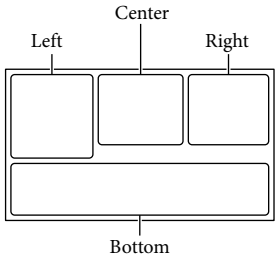
Works with PlayStation®3

Add further enjoyment with your PlayStation 3 by downloading the application for PlayStation 3 from PlayStation Store (where available.)

The application for PlayStation 3 requires PlayStation Network account and application download.
Accessible in areas where the PlayStation Store is available.

Screen indicators



Left

Indicator	Meaning
MENU	MENU button
	Self-timer recording
4:3	Wide Mode
	[Face Detection] set to [Off]
	Manual focus
AF-S / AF-C / DMF / MF	Focus Mode
	White Balance
	SteadyShot off
WS	White Balance Shift
70 100	Zebra
PEAK R PEAK Y PEAK W	Peaking
CINEMA	Cinematone
	Destination

Center

Indicator	Meaning
[STBY]/[REC]	Recording status
	Slide show set
	Warning
	Playback mode

Right

Indicator	Meaning
HD 50i HQ	Recording image quality (HD/STD), frame rate (50p/50i/25p) and recording mode (PS/FX/FH/HQ/LP)
60%	Remaining battery
W T	Zoom-bar
BRK ±0.7 BRK ±0.3	Drive Mode
RAW RAW+J	RAW/JPEG
	Recording/playback/editing media
0:00:00	Counter (hour:minute:second)
00Min	Estimated recording remaining time
3:2 16.0M 16:9 13.6M 3:2 8.4M 16:9 7.1M 3:2 4.0M 16:9 3.4M	Photo size
9999	Approximate number of recordable photos and photo size
100	Playback folder
100/112	Current playing movie or photo/Number of total recorded movies or photos
	An external media device is connected

Bottom

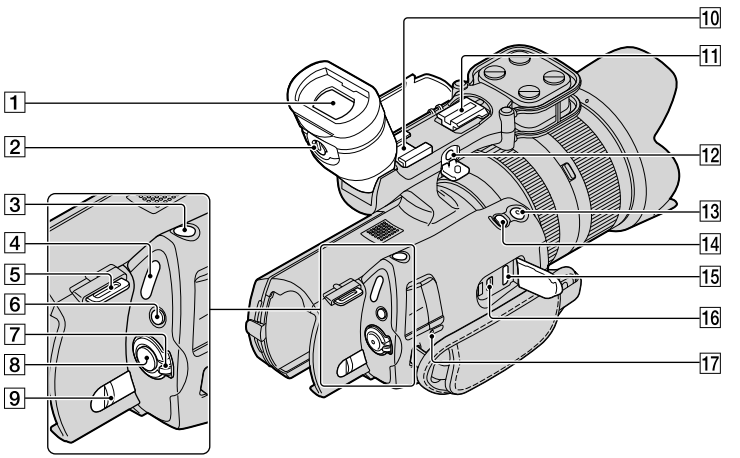
Indicator	Meaning
	View Images button
	Wind Noise Reduct.
♪5.1ch ♪2ch	Audio Mode
	Audio Rec Level
	Audio Level Display
EV	AE Shift

Indicator	Meaning
A E	Exposure Auto/ Exposure Manual
F1.4	IRIS
12 dB	Gain
ISO 200	ISO
4000	Shutter Speed
	Slide show button
101-0005	Data file name
	Protected image
HSS HSS SL SL REAR	Flash
	Flash Level
	Red Eye Reduction

- Indicators and their positions are approximate and may differ from what you actually see.
- Some indicators may not appear, depending on your camcorder model.

Parts and controls

The illustrations attached the lens (E 18-200mm F3.5-6.3 OSS) supplied with NEX-VG20EH are described here.
Figures in ( ) are reference pages.



1 Viewfinder (25)

2 Viewfinder lens adjustment lever (25)

3 PHOTO button (31)

4 (Movie)/ (Photo) lamps (30)

5 Hook for shoulder strap

6 MODE button (30)

7 ON/OFF (power) switch (21)

8 START/STOP button (30)

9 BATT (battery) release lever (14)

10 Accessory shoe

Attach a gun microphone (sold separately), etc. If you attach accessories to the accessory shoe and auto lock accessory shoe simultaneously, the accessories may collide with each other and be damaged.

11 Auto lock accessory shoe

Attach a Sony external flash (sold separately), etc.

The flash does not work when [Drive Mode] is set to [Bracket: 0.3 EV] or [Bracket: 0.7 EV]. There are certain Sony flashes or functions that cannot be used with your camcorder. For the compatibility of a particular flash unit, visit the Sony web site in your area, or consult your Sony dealer or local authorized Sony service facility.

12 MIC (PLUG IN POWER) jack

When an external microphone (sold separately) is connected, it takes precedence over the built-in microphone.

13 START/STOP button on the grip

Use this button when recording at a different angle.

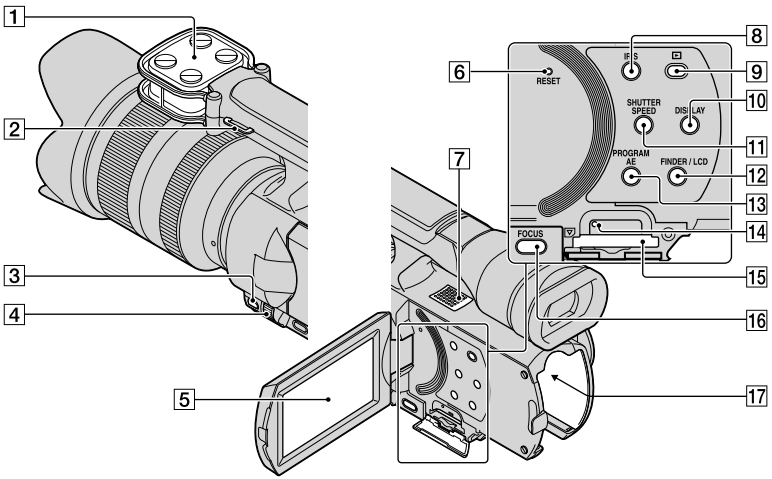
14 EXPANDED FOCUS button

The EXPANDED FOCUS button has a tactile dot. Use as a guide for the operation.

15 HDMI OUT jack (38)

16 (USB) jack (50)

17 CHG (charge) lamp (13)



1 Microphone

2 Hook for shoulder strap

3 MANUAL button (33)

4 MANUAL dial (33)

5 LCD screen/Touch panel
If you rotate the LCD panel 180 degrees, you can close the LCD panel with the LCD screen facing out. This is convenient during playback operations.

6 RESET button
Press RESET using a pointed object.
Press RESET to initialize all the settings including the clock setting.

7 Speaker

8 IRIS button

9 ▶ (View Images) button (34)

10 DISPLAY button (24)

11 SHUTTER SPEED button

12 FINDER/LCD button (24)

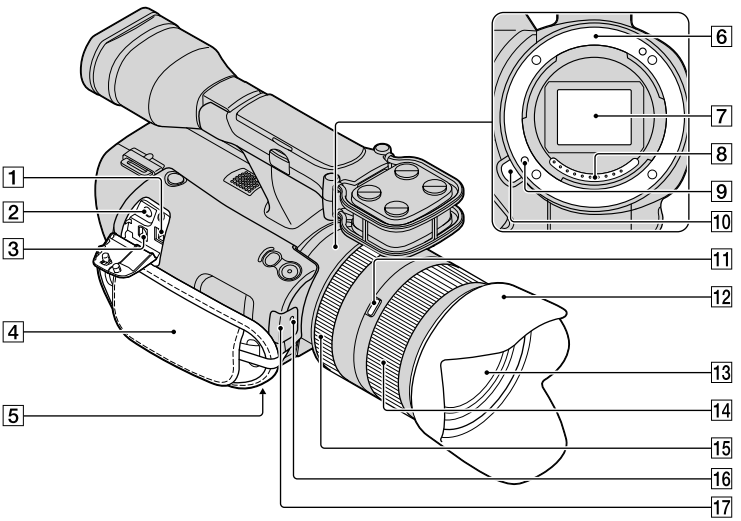
13 PROGRAM AE button

14 Memory card access lamp (27)
While the lamp is lit or flashing, the camcorder is reading or writing data.

15 Memory card slot (27)

16 FOCUS button

17 Battery terminal (13)



1 DC IN jack (13)

2 ∩ (headphones) jack
Use stereo minijack headphones.

3 A/V Remote Connector (38)
This terminal is to interface your camcorder to another device. You can output still images, movies and sound to a connected TV, or control your camcorder when it is mounted on a remote control video tripod.

4 Grip belt (29)

5 Tripod receptacle (33)

6 Mount

7 Image sensor
Do not touch or dirty the image sensor.

8 Lens contacts
Do not touch or dirty the lens contacts.

9 Lens lock pin

10 Lens release button

11 Zoom lock switch

12 Lens hood

13 Lens

14 Zoom ring

15 Focusing ring

16 Camera recording lamp

17 Remote sensor (59)

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You will find the menu lists on pages 57 to 59.

HANDYCAM

GB

Additional information on this product and answers to frequently asked questions can be found at our Customer Support Website.

http://www.sony.net/

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